INSTALLATION INSTRUCTIONS

FOR THE RHEEM H2AC ROOFTOP UNIT FEATURING eSYNC INTEGRATION TECHNOLOGY

RKHL- SERIES 10 TON [35.2 kW]



eSYNC™
INTEGRATION TECHNOLOGY

Featuring Industry Standard R-410A

R-410A

AHRI CERTIFIED®
www.ahridirectory.org
Unitary Large AC
AHRI Standard 340/360
Certification applies only when the complete system is listed with AHRI.

RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

⚠WARNING

— Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.

— WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not return to your home until authorized by the gas supplier or fire department.

— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
- U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs.

— Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

BA001-02

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

c UL us LISTED

Accredited by the RvA
ABS Quality Evaluations, Inc. Management System Certification
ANAB ACCREDITED
ISO 9001:2008
Certificate Number: 30164

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SAFETY INFORMATION

⚠ WARNING

USE ONLY WITH TYPE OF GAS APPROVED FOR THIS UNIT. REFER TO THE UNIT RATING PLATE.

⚠ WARNING

INSTALL THIS UNIT ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THE FACTORY SUPPLIED EXHAUST AND COMBUSTION AIR INLET HOODS ONLY, AS SPECIFIED IN THE EXHAUST AND COMBUSTION AIR INLET HOODS INSTALLATION SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

NEVER TEST FOR GAS LEAKS WITH AN OPEN FLAME. USE A COMMERCIALLY AVAILABLE SOAP SOLUTION MADE SPECIFICALLY FOR THE DETECTION OF LEAKS TO CHECK ALL CONNECTIONS, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

ALWAYS INSTALL UNIT TO OPERATE WITHIN THE UNIT'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO UNIT RATING PLATE.

⚠ WARNING

WHEN A UNIT IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE UNIT TO AREAS OUTSIDE THE SPACE CONTAINING THE UNIT, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE UNIT CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE UNIT.

⚠ WARNING

THIS UNIT MAY BE USED TO HEAT THE BUILDING OR STRUCTURE DURING CONSTRUCTION IF THE FOLLOWING INSTALLATION REQUIREMENTS ARE MET. INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

- **PROPER VENT INSTALLATION;**
- **FURNACE OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE FURNACE;**
- **AIR FILTERS IN PLACE;**
- **SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND**
- **INSTALLATION OF EXHAUST AND COMBUSTION AIR INLET HOODS COMPLETED;**
- **CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS.**

⚠ WARNING

THE MANUFACTURER'S WARRANTY DOES NOT COVER ANY DAMAGE OR DEFECT TO THE AIR CONDITIONER CAUSED BY THE ATTACHMENT OR USE OF ANY COMPONENTS, ACCESSORIES OR DEVICES (OTHER THAN THOSE AUTHORIZED BY THE MANUFACTURER) INTO, ONTO OR IN CONJUNCTION WITH THE AIR CONDITIONER. YOU SHOULD BE AWARE THAT THE USE OF UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES MAY ADVERSELY AFFECT THE OPERATION OF THE AIR CONDITIONER AND MAY ALSO ENDANGER LIFE AND PROPERTY. THE MANUFACTURER DISCLAIMS ANY RESPONSIBILITY FOR SUCH LOSS OR INJURY RESULTING FROM THE USE OF SUCH UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES.

This booklet contains the installation and operating instructions for your combination gas heating/electric cooling unit. There are some precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions.

Read this booklet and any instructions packaged with separate equipment required to make up the system prior to installation. Give this booklet to the owner and explain its provisions. The owner should retain this booklet for future reference.

CHECKING PRODUCT RECEIVED

Upon receiving the unit, inspect it for any damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. **IMPORTANT:** Check the unit model number, heating size, electrical characteristics, and accessories to determine if they are correct.

I. SPECIFICATIONS

A. GENERAL

The Rheem H2AC Rooftop Unit Combination Gas Heating/Electric Cooling Rooftop with integrated Potable Water Heating is available in 150,000 BTUH and 225,000 BTUH gas heating inputs. Cooling capacity is 10 nominal tons.

Potable water heating capacities range from approximately 120,000 BTUH to 168,000 BTUH depending on water temperature, indoor air temperatures, and indoor CFM.

Units are designed for downflow-only supply and return air and are weatherized and intended for outdoor installation.

Since the waste-heat recovery/water heating feature of the H2AC Rooftop Unit only functions during the cooling mode, the unit should be installed to serve the area of the structure having the largest cooling run-time load, for instance the kitchen area of the restaurant, in order to provide the greatest water heating and energy saving benefits.

⚠ WARNING

UNITS ARE NOT DESIGN CERTIFIED TO BE INSTALLED INSIDE THE STRUCTURE. DOING SO CAN CAUSE INADEQUATE UNIT PERFORMANCE AS WELL AS PROPERTY DAMAGE AND CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

The information on the rating plate is in compliance with the FTC and DOE rating for single phase units. The following information is for three phase units which **are not** covered under the DOE certification program.

1. The energy consumption of the ignition system used with this unit is 175 watts.
2. The efficiency rating of this unit is a product thermal efficiency rating determined under continuous operating conditions independent of any installed system.

B. MAJOR COMPONENTS

The typical unit includes a hermetically-sealed refrigerating system consisting of a scroll compressor, condenser coil, evaporator coil with TXV, a circulation air blower, a condenser fan, a refrigerant to air heat exchanger assembly, a refrigerant to water heat exchanger, 3-way valve, and 2 solenoid valves, gas burner and control assembly, combustion air motor and fan, and all necessary internal electrical wiring. The cooling systems of these units are factory-evacuated, charged and performance tested. Refrigerant amount and type are indicated on rating plate.

C. R-410A REFRIGERANT

All units are factory charged with R-410A refrigerant.

1. Specifications of R-410A:

Application: R-410A is not a drop-in replacement for R-22; equipment designs must accommodate its higher pressures. It cannot be retrofitted into R-22 units.

Pressure: The pressure of R-410A is approximately 60% (1.6 times) greater than R-22. Recovery and recycle equipment, pumps, hoses, and the like need to have design pressure ratings appropriate for R-410A. *Manifold sets need to range up to 800 psig high-side and 250 psig low-side with a 550 psig low-side retard. Hoses need to have a service pressure rating of 800 psig. Recovery cylinders need to have a 400 psig service pressure rating.* DOT 4BA400 or DOT BW400.

Combustibility: At pressures above 1 atmosphere, mixture of R-410A and air can become combustible. **R-410A and air should never be mixed in tanks or supply lines, or be allowed to accumulate in storage tanks. Leak checking should never be done with a mixture of R-410A and air.** Leak checking can be performed safely with nitrogen or a mixture of R-410A and nitrogen.

2. Quick Reference Guide For R-410A

- R-410A refrigerant operates at approximately 60% higher pressure (1.6 times) than R-22. Ensure that servicing equipment is designed to operate with R-410A.
- R-410A refrigerant cylinders are pink.
- R-410A, as with other HFC's is only compatible with POE oils.
- Vacuum pumps will not remove moisture from POE oil.
- R-410A systems are to be charged with liquid refrigerants. Prior to March 1999, R-410A refrigerant cylinders had a dip tube. These cylinders should be kept upright for equipment charging. Post March 1999 cylinders do not have a dip tube and should be inverted to ensure liquid charging of the equipment.
- Do not install a suction line filter drier in the liquid line.
- A liquid line filter drier is standard on every unit.
- Desiccant (drying agent) must be compatible for POE oils and R-410A.

3. Evaporator Coil/ Expansion Device

The expansion device is specifically designed to operate with R-410A. **DO NOT use an R-22. The existing evaporator must be replaced with the factory specified device evaporator specifically designed for R-410A.**

4. Tools Required For Installing & Servicing R-410A Models

Manifold Sets:
-Up to 800 PSIG High Side
-Up to 250 PSIG Low Side
-550 PSIG Low Side Retard

Manifold Hoses:
-Service Pressure Rating of 800 PSIG

Recovery Cylinders:
-400 PSIG Pressure Rating
-Dept. of Transportation 4BA400 or BW400

⚠ CAUTION

R-410A SYSTEMS OPERATE AT HIGHER PRESSURE THAN R-22 SYSTEMS. DO NOT USE R-22 SERVICE EQUIPMENT OR COMPONENTS ON R-410A EQUIPMENT.

Unit Dimensions

IMPORTANT: THIS UNIT MUST BE MOUNTED LEVEL IN BOTH DIRECTIONS TO ALLOW WATER TO DRAIN FROM THE CONDENSER SECTION AND CONDENSATE PAN.

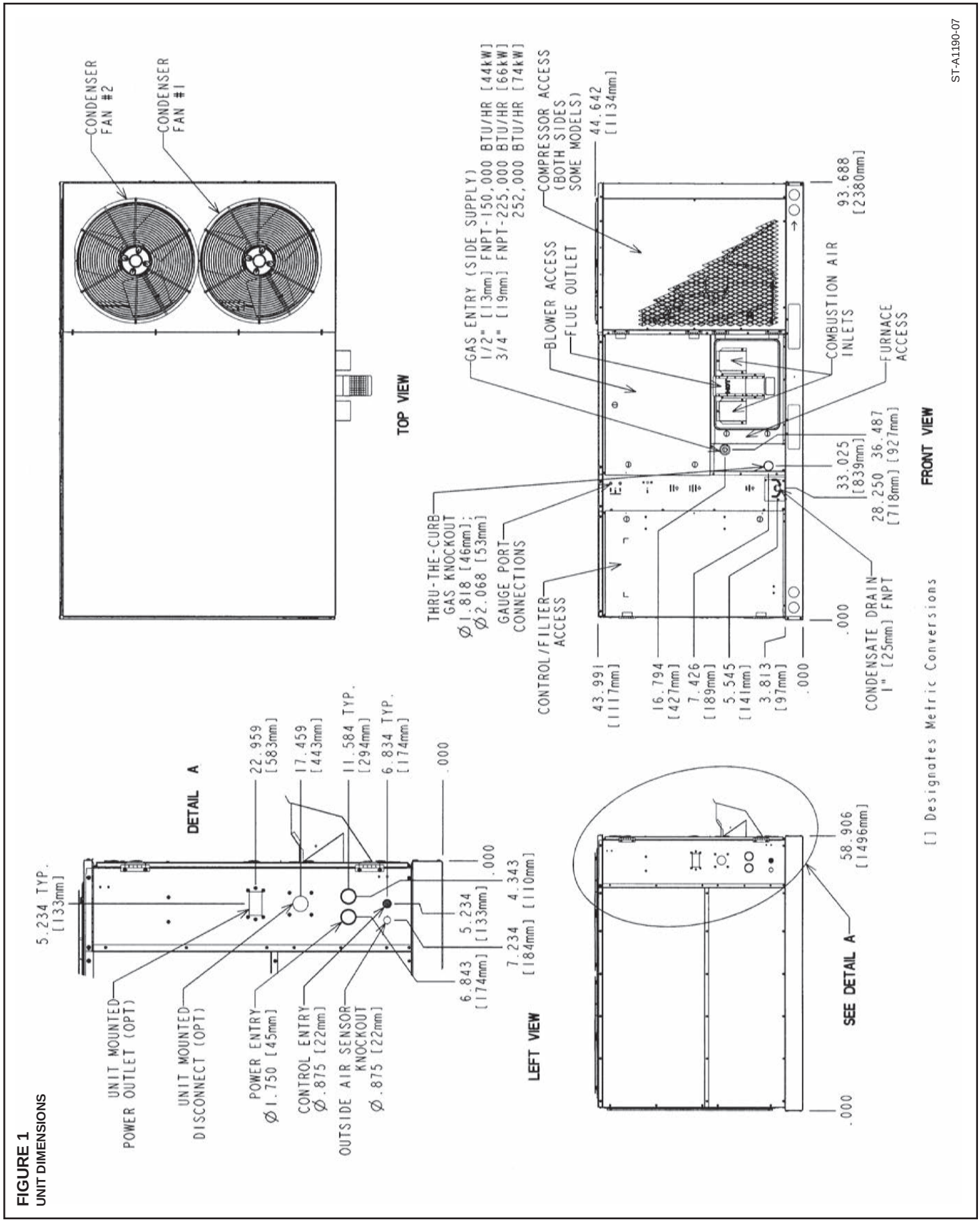
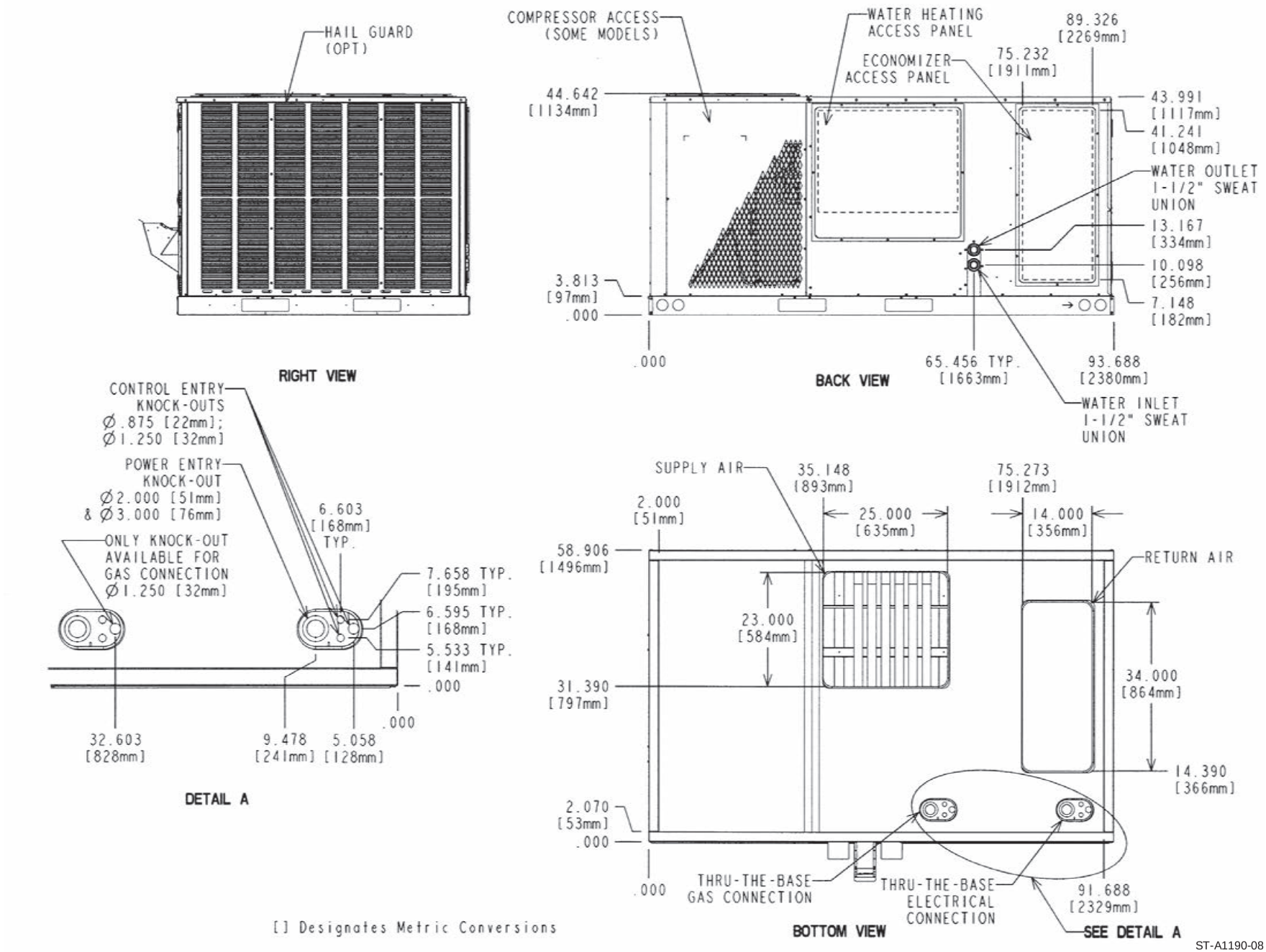


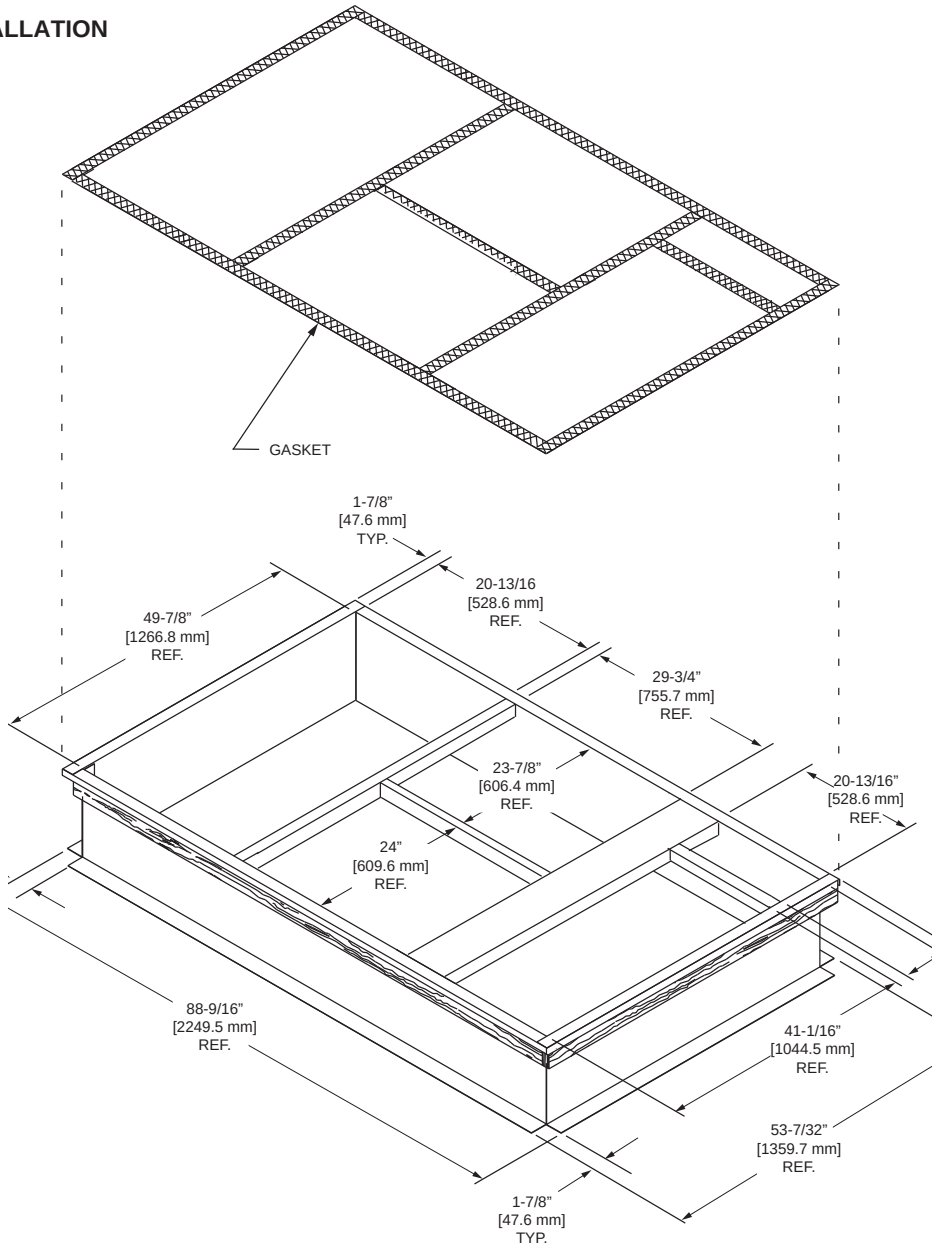
FIGURE 1
UNIT DIMENSIONS

FIGURE 2
UNIT DIMENSIONS



ST-A1190-08

FIGURE 3
ROOFCURB INSTALLATION



GENERAL DATA - RKHL MODELS

NOM. SIZES 10 TON [35.2 kW]

Model RKHL-Series	C120CL15E	C120CL22E	C120CM15E	C120CM22E
Cooling Performance[1]				
Gross Cooling Capacity Btu [kW]	119,000 [34.87]	119,000 [34.87]	119,000 [34.87]	119,000 [34.87]
EER/SEER[2]	11.25/NA	11.25/NA	11.25/NA	11.25/NA
Nominal CFM/AHRI Rated CFM [L/s]	4000/3600 [1888/1699]	4000/3600 [1888/1699]	4000/3600 [1888/1699]	4000/3600 [1888/1699]
AHRI Net Cooling Capacity Btu [kW]	115,000 [33.69]	115,000 [33.69]	115,000 [33.69]	115,000 [33.69]
Net Sensible Capacity Btu [kW]	85,300 [24.99]	85,300 [24.99]	85,300 [24.99]	85,300 [24.99]
Net Latent Capacity Btu [kW]	29,700 [8.7]	29,700 [8.7]	29,700 [8.7]	29,700 [8.7]
IEER[3]	11.9	11.9	11.9	11.9
Net System Power kW	10.2	10.2	10.2	10.2
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	75,000/150,000 [21.97/43.95]	112,500/225,000 [32.96/65.92]	75,000/150,000 [21.97/43.95]	112,500/225,000 [32.96/65.92]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	60,750/121,500 [17.8/35.6]	91,125/182,250 [26.7/53.4]	60,750/121,500 [17.8/35.6]	91,125/182,250 [26.7/53.4]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9[30.6]/25-55 [13.9-30.6]	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9[30.6]/25-55 [13.9-30.6]
Steady State Efficiency (%)	81	81	81	81
No. Burners	6	9	6	9
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.5 [12.7]	0.75 [12.7]	0.5 [12.7]	0.75 [12.7]
Compressor				
No./Type	1/Scroll	1/Scroll	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)[5]	88	88	88	88
Outdoor Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1 [25.4]	1 [25.4]	1 [25.4]	1 [25.4]
Face Area sq. ft. [sq. m]	27 [2.51]	27 [2.51]	27 [2.51]	27 [2.51]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Indoor Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	13.5 [1.25]	13.5 [1.25]	13.5 [1.25]	13.5 [1.25]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Outdoor Fan - Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	8400 [3964]	8400 [3964]	8400 [3964]	8400 [3964]
No. Motors/HP	2 at 1/3 HP	2 at 1/3 HP	2 at 1/3 HP	2 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan - Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	1/15x15 [381x381]	1/15x15 [381x381]	1/15x15 [381x381]	1/15x15 [381x381]
Drive Type/No. Speeds	Belt/Variable	Belt/Variable	Belt/Variable	Belt/Variable
No. Motors	1	1	1	1
Motor HP	2	2	3	3
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	56	56
Potable Water Heat Recovery				
Heat Exchanger Type	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate
Material	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel
No. Flat Plates	25	25	25	25
Unit Water Connections No./Size in. [mm]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]
Water Pump - Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
GPM [L/s]	30 [1.89]	30 [1.89]	30 [1.89]	30 [1.89]
Heat Pressure ft. H20 [kPa]	25 [74.7]	25 [74.7]	25 [74.7]	25 [74.7]
Motor HP	1/3	1/3	1/3	1/3
Motor RPM	3450	3450	3450	3450
Filter - Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(NO.) Size Recommended in. [mm x mm x mm]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]
Refrigerant Charge Oz. [g]	217.6 [6169]	217.6 [6169]	217.6 [6169]	217.6 [6169]
Weights				
Net Weights lbs. [kg]	1143 [518]	1143 [518]	1151 [522]	1151 [522]
Ship Weights lbs. [kg]	1180 [535]	1180 [535]	1188 [539]	1188 [539]

GENERAL DATA - RKHL MODELS

NOM. SIZES 10 TON [35.2 kW]

Model RKHL-Series	C120DL15E	C120DL22E	C120DM15E	C120DM22E
Cooling Performance[1]				
Gross Cooling Capacity Btu [kW]	119,000 [34.87]	119,000 [34.87]	119,000 [34.87]	119,000 [34.87]
EER/SEER[2]	11.25/NA	11.25/NA	11.25/NA	11.25/NA
Nominal CFM/AHRI Rated CFM [L/s]	4000/3600 [1888/1699]	4000/3600 [1888/1699]	4000/3600 [1888/1699]	4000/3600 [1888/1699]
AHRI Net Cooling Capacity Btu [kW]	115,000 [33.69]	115,000 [33.69]	115,000 [33.69]	115,000 [33.69]
Net Sensible Capacity Btu [kW]	85,300 [24.99]	85,300 [24.99]	85,300 [24.99]	85,300 [24.99]
Net Latent Capacity Btu [kW]	29,700 [8.7]	29,700 [8.7]	29,700 [8.7]	29,700 [8.7]
IEER[3]	11.9	11.9	11.9	11.9
Net System Power kW	10.2	10.2	10.2	10.2
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	75,000/150,000 [21.97/43.95]	112,500/225,000 [32.96/65.92]	75,000/150,000 [21.97/43.95]	112,500/225,000 [32.96/65.92]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	60,750/121,500 [17.8/35.6]	91,125/182,250 [26.7/53.4]	60,750/121,500 [17.8/35.6]	91,125/182,250 [26.7/53.4]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9[30.6]/25-55 [13.9-30.6]	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9[30.6]/25-55 [13.9-30.6]
Steady State Efficiency (%)	81	81	81	81
No. Burners	6	9	6	9
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.5 [12.7]	0.75 [12.7]	0.5 [12.7]	0.75 [12.7]
Compressor				
No./Type	1/Scroll	1/Scroll	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)[5]	88	88	88	88
Outdoor Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1 [25.4]	1 [25.4]	1 [25.4]	1 [25.4]
Face Area sq. ft. [sq. m]	27 [2.51]	27 [2.51]	27 [2.51]	27 [2.51]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Indoor Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	13.5 [1.25]	13.5 [1.25]	13.5 [1.25]	13.5 [1.25]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Outdoor Fan - Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	8400 [3964]	8400 [3964]	8400 [3964]	8400 [3964]
No. Motors/HP	2 at 1/3 HP	2 at 1/3 HP	2 at 1/3 HP	2 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan - Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	1/15x15 [381x381]	1/15x15 [381x381]	1/15x15 [381x381]	1/15x15 [381x381]
Drive Type/No. Speeds	Belt/Variable	Belt/Variable	Belt/Variable	Belt/Variable
No. Motors	1	1	1	1
Motor HP	2	2	3	3
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	56	56
Potable Water Heat Recovery				
Heat Exchanger Type	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate	Vent Double-Wall Flat Plate
Material	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel
No. Flat Plates	25	25	25	25
Unit Water Connections No./Size in. [mm]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]
Water Pump - Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
GPM [L/s]	30 [1.89]	30 [1.89]	30 [1.89]	30 [1.89]
Heat Pressure ft. H20 [kPa]	25 [74.7]	25 [74.7]	25 [74.7]	25 [74.7]
Motor HP	1/3	1/3	1/3	1/3
Motor RPM	3450	3450	3450	3450
Filter - Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(NO.) Size Recommended in. [mm x mm x mm]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]	(6)2x18x18 [51x457x457]
Refrigerant Charge Oz. [g]	217.6 [6169]	217.6 [6169]	217.6 [6169]	217.6 [6169]
Weights				
Net Weights lbs. [kg]	1143 [518]	1143 [518]	1151 [522]	1151 [522]
Ship Weights lbs. [kg]	1180 [535]	1180 [535]	1188 [539]	1188 [539]

NOTES:

1. Cooling Performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20° of nom cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Stanard 340/360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. IEER is rated in accordance with AHRI Standard 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

ELECTRICAL DATA - RKHL MODELS

ELECTRICAL DATA - RKHL SERIES					
		C120CL	C120CM	C120DL	C120DM
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506
	Volts	208/230	208/230	460	460
	Minimum Circuit Ampacity	61/61	66/66	35	38
	Minimum Overcurrent Protection Device Size	60/60	70/70	35	35
	Maximum Overcurrent Protection Device Size	90/90	100/100	50	50
Compressor Motor	No.	1	1	1	1
	Volts	200/240	200/240	480	480
	Phase	3	3	3	3
	RPM	3450	3450	3450	3450
	HP, Compressor 1	10	10	10	10
	Amps (RLA), Comp. 1	37.1/37.1	37.1/37.1	20.9	20.9
	Amps (LRA), Comp. 1	225/225	225/225	114	114
Condenser Motor	No.	2	2	2	2
	Volts	208/230	208/230	460	460
	Phase	1	1	1	1
	HP	1/3	1/3	1/3	1/3
	Amps (FLA, each)	2.4/2.4	2.4/2.4	1.4	1.4
	Amps (LRA, each)	4.7/4.7	4.7/4.7	2.4	2.4
Evaporator Fan	No.	1	1	1	1
	Volts	208/230	208/230	460	460
	Phase	3	3	3	3
	HP	2	3	2	3
	Amps (FLA, each)	8/8	13/13	4	7
	Amps (LRA, each)	56/56	74.5/74.5	28	38.1
Water Pump	No.	1	1	1	1
	Volts	208/230	208/230	208/230	208/230
	Phase	1	1	1	1
	HP	1/3	1/3	1/3	1/3
	Amps (FLA, each)	1.7	1.7	1.7	1.7
	Amps (LRA, each)	5.1	5.1	5.1	5.1

GROSS SYSTEMS PERFORMANCE DATA – RKHL-C120

Entering Indoor Air @ 80°F [26.7°C] dbE ①

Outdoor DB	wbE	71ºF [21.7ºC]			67ºF [19.4ºC]			63ºF [17.2ºC]		
	CFM [L/s]	4800 [2266]	3600 [1699]	3200 [1510]	4800 [2266]	3600 [1699]	3200 [1510]	4800 [2266]	3600 [1699]	3200 [1510]
	DR ①	0	0.05	0.08	0	0.05	0.08	0	0.05	0.08
75ºF [23.9ºC]	Total BTUH [kW]	146.9 [43.0]	138.5 [40.6]	135.7 [39.8]	138.9 [40.7]	130.9 [38.4]	128.3 [37.6]	132.6 [38.9]	125 [36.6]	122.5 [35.9]
	Sens BTUH [kW]	98.7 [28.9]	77 [22.6]	70.4 [20.6]	115.7 [33.9]	92.1 [27.0]	84.9 [24.9]	129.1 [37.8]	104.1 [30.5]	96.3 [28.2]
	Power	7.6	7.4	7.3	7.5	7.3	7.2	7.5	7.2	7.2
80ºF [26.7ºC]	Total BTUH [kW]	144.2 [42.3]	135.9 [39.8]	133.2 [39.0]	136.1 [39.9]	128.4 [37.6]	125.8 [36.9]	129.9 [38.1]	122.4 [35.9]	120 [35.2]
	Sens BTUH [kW]	98.6 [28.9]	77 [22.6]	70.4 [20.6]	115.4 [33.8]	92.2 [27.0]	85 [24.9]	129.1 [37.8]	104.2 [30.5]	96.5 [28.3]
	Power	8	7.8	7.7	7.9	7.7	7.6	7.8	7.6	7.5
85ºF [29.4ºC]	Total BTUH [kW]	141.2 [41.4]	133.2 [39.0]	130.5 [38.2]	133.2 [39.0]	125.6 [36.8]	123 [36.0]	126.9 [37.2]	119.7 [35.1]	117.3 [34.4]
	Sens BTUH [kW]	97.9 [28.7]	76.7 [22.5]	70.2 [20.6]	114.9 [33.7]	91.8 [26.9]	84.6 [24.8]	126.9 [37.2]	103.9 [30.4]	96.2 [28.2]
	Power	8.4	8.1	8.1	8.3	8.1	8	8.2	8	7.9
90ºF [32.2ºC]	Total BTUH [kW]	138.1 [40.5]	130.2 [38.1]	127.6 [37.4]	130 [38.1]	122.6 [35.9]	120.1 [35.2]	123.8 [36.3]	116.7 [34.2]	114.3 [33.5]
	Sens BTUH [kW]	96.8 [28.4]	75.9 [22.2]	69.5 [20.4]	113.7 [33.3]	91 [26.7]	83.9 [24.6]	123.8 [36.3]	103 [30.2]	95.4 [28.0]
	Power	8.8	8.5	8.5	8.7	8.5	8.4	8.6	8.4	8.3
95ºF [35.0ºC]	Total BTUH [kW]	134.7 [39.5]	127 [37.2]	124.4 [36.4]	126.7 [37.1]	119.4 [35.0]	117 [34.3]	120.4 [35.3]	113.5 [33.3]	111.2 [32.6]
	Sens BTUH [kW]	95.1 [27.9]	74.6 [21.9]	68.3 [20.0]	112.1 [32.8]	89.7 [26.3]	82.8 [24.3]	120.4 [35.3]	101.8 [29.8]	94.3 [27.6]
	Power	9.2	9	8.9	9.2	8.9	8.8	9.1	8.8	8.7
100ºF [37.8ºC]	Total BTUH [kW]	131.1 [38.4]	123.6 [36.2]	121.1 [35.5]	123.1 [36.1]	116.1 [34.0]	113.7 [33.3]	116.8 [34.2]	110.2 [32.3]	107.9 [31.6]
	Sens BTUH [kW]	92.9 [27.2]	72.9 [21.4]	66.7 [19.5]	109.9 [32.2]	88.1 [25.8]	81.3 [23.8]	116.8 [34.2]	100.2 [29.4]	92.8 [27.2]
	Power	9.7	9.4	9.4	9.6	9.4	9.3	9.6	9.3	9.2
105ºF [40.6ºC]	Total BTUH [kW]	127.3 [37.3]	120.1 [35.2]	117.6 [34.5]	119.3 [35.0]	112.5 [33.0]	110.2 [32.3]	113 [33.1]	106.6 [31.2]	104.4 [30.6]
	Sens BTUH [kW]	90.2 [26.4]	70.9 [20.8]	64.9 [19.0]	107.2 [31.4]	86 [25.2]	79.4 [23.3]	113 [33.1]	98 [28.7]	90.8 [26.6]
	Power	10.2	9.9	9.8	10.2	9.9	9.8	10.1	9.8	9.7
110ºF [43.3ºC]	Total BTUH [kW]	123.3 [36.1]	116.3 [34.1]	113.9 [33.4]	115.3 [33.8]	108.7 [31.8]	106.5 [31.2]	109 [31.9]	102.8 [30.1]	100.7 [29.5]
	Sens BTUH [kW]	87 [25.5]	68.3 [20.0]	62.5 [18.3]	104 [30.5]	83.4 [24.4]	77 [22.6]	109 [31.9]	95.5 [28.0]	88.6 [26.0]
	Power	10.8	10.5	10.4	10.7	10.4	10.3	10.6	10.3	10.2
115ºF [46.1ºC]	Total BTUH [kW]	119.1 [34.9]	112.3 [32.9]	110 [32.2]	111.1 [32.6]	104.7 [30.7]	102.6 [30.1]	104.8 [30.7]	98.8 [28.9]	96.8 [28.4]
	Sens BTUH [kW]	83.3 [24.4]	65.3 [19.1]	59.7 [17.5]	100.3 [29.4]	80.4 [23.6]	74.2 [21.7]	104.8 [30.7]	92.5 [27.1]	85.8 [25.1]
	Power	11.3	11	10.9	11.3	10.9	10.8	11.2	10.9	10.7

DR — Depression ratio
dbE — Entering air dry bulb
wbE — Entering air wet bulb

Total — Total capacity x 1000 BTUH
Sens — Sensible capacity x 1000 BTUH
Power — KW input

NOTES: ① When the entering air dry bulb is other than 80°F [27°C], adjust the sensible capacity from the table by adding [1.10 x CFM x (1 – DR) x (dbE – 80)].

[ ] Designates Metric Conversions

WATER HEATING PERFORMANCE DATA - C120

			ENTERING INDOOR AIR @ 80°F [26.7°C] dbe										
		wbe	71°F [21.7°C]			67°F [19.4°C]			63°F [19.4°C]				
		CFM [Ls]	4800 [2266]	3600 [1699]	3200 [1510]	4800 [2266]	3600 [1699]	3200 [1510]	4800 [2266]	3600 [1699]	3200 [1510]		
OUTLET WATER TEMP. °F [°C]	75 [23.9]	Total MBTUH [kW]	168.41 49.36	166.75 48.87	161.74 47.40	157.95 46.29	156.39 45.83	151.69 44.46	147.43 43.21	145.97 42.78	141.59 41.50		
		Power, Watts	8780	7980	7580	8623	7823	7423	8545	7745	7345		
	80 [26.7]	Total MBTUH [kW]	166.19 48.71	164.54 48.23	159.61 46.78	155.73 45.64	154.18 45.19	149.56 43.83	145.20 42.56	143.77 42.14	139.45 40.87		
		Power, Watts	9218	8418	8018	9052	8252	7852	8970	8170	7770		
	85 [29.4]	Total MBTUH [kW]	163.97 48.06	162.34 47.58	157.41 46.15	153.50 44.99	151.98 44.54	147.42 43.21	142.98 41.91	141.57 41.49	137.32 40.25		
		Power, Watts	9655	8855	8455	9482	8682	8282	9295	8595	8195		
	90 [32.2]	Total MBTUH [kW]	161.74 47.40	160.14 46.93	155.34 45.53	151.28 44.34	149.78 43.90	145.29 42.58	140.76 41.25	139.37 40.85	135.18 39.62		
		Power, Watts	10093	9293	8893	9911	9111	8711	9819	9019	8619		
	95 [35.0]	Total MBTUH [kW]	159.52 46.75	157.94 46.29	153.20 44.90	149.06 43.69	147.58 43.25	143.15 41.96	138.54 40.60	137.16 40.20	133.05 38.99		
		Power, Watts	10530	9730	9330	10340	9540	9140	10244	9444	9044		
	100 [37.8]	Total MBTUH [kW]	157.30 46.10	155.74 45.64	151.07 44.28	146.83 43.03	145.38 42.61	141.02 41.33	136.31 36.95	134.96 39.56	130.91 38.37		
		Power, Watts	10968	10168	9768	10769	9969	9569	9869	9869	9469		
	105 [40.6]	Total MBTUH [kW]	155.07 45.45	153.54 45.00	148.93 43.65	144.61 42.38	143.18 41.96	138.88 40.70	134.09 39.30	132.76 38.91	128.78 37.74		
		Power, Watts	11406	10606	10206	11198	10398	9998	11094	10294	9894		
	110 [43.3)	Total MBTUH [kW]	152.85 44.80	151.34 44.35	146.80 43.02	142.39 41.73	140.98 41.32	136.75 40.08	131.37 38.65	130.56 38.27	126.64 37.12		
		Power, Watts	11406	11043	10643	11627	10827	10427	11085	10285	9885		
	115 [46.1]	Total MBTUH [kW]	150.63 44.15	149.14 43.71	144.66 42.40	140.16 41.08	138.78 40.67	134.61 39.45	129.64 38.00	128.36 37.62	124.51 36.49		
		Power, Watts	12281	11481	11081	12056	11256	10856	11943	11143	10743		
	1251/85 [51.7]	Total MBTUH [kW]	146.18 42.84	144.74 42.42	140.39 41.15	135.72 39.78	134.38 39.38	130.34 38.20	125.20 36.69	123.96 36.33	120.24 35.24		
		Power, Watts	13156	12356	11956	12941	12114	11714	12792	11992	11592		

II. INSTALLATION

A. GENERAL

1. INSTALLATION — Install this unit in accordance with The American National Standard Z223.1-latest edition booklet entitled “National Fuel Gas Code,” and the requirements or codes of the local utility or other authority having jurisdiction.

   Additional helpful publications available from the “National Fire Protection Association” are: NFPA-90A - Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B - Warm Air Heating and Air Conditioning Systems 1984.

   These publications are available from:

   National Fire Protection
   Association, Inc.
   Batterymarch Park
   Quincy, MA 02269

2. PRE-INSTALLATION CHECK-POINTS — Before attempting any installation, carefully consider the following points:

   Structural strength of supporting members (Rooftop Installation)
   Clearances and provision for servicing
   Power supply and wiring
   Gas supply and piping
   Air duct connections and sizing
   Drain facilities and connections
   Location for minimum noise and vibration
   Water piping supply length and routing

B. H_2AC ROOFTOP UNIT SPECIAL CONSIDERATIONS

Since the waste-heat recovery/water heating feature of the H_2AC rooftop unit only functions during the cooling mode, the unit should be installed to serve the area of the structure having the largest cooling run-time, for instance the kitchen area of a restaurant, in order to provide the greatest water heating and energy saving benefits.

The H_2AC rooftop unit is equipped with an outdoor temperature sensor that energizes the water pump continuously below 35°F to minimize the chance of the water system freezing, however this is not intended to be the sole method of unit freeze protection. **If the H_2AC rooftop unit is installed in a geographic location where freezing temperature can occur, the water lines, valves, and couplings connected outside the unit must be adequately protected with insulation and heat tape suitable for the lowest expected temperatures.**

Alternately, the unit and all connecting lines can be drained of water and the unit heat exchanger, pump, and internal piping winterized using a non-toxic recreational vehicle type of anti-freeze suitable for potable water systems.

The H_2AC rooftop unit is equipped with a water leak sensor designed to sense water that would accumulate in the pan under the water pump and refrigerant-to-water heat exchanger assembly located on the blower deck. If a leak is sensed in that area an alarm is triggered on the RTU-C (ClearControl) control board and a water shutoff relay is energized to activate the **optional** RXMV-AH electric water shut-off valve. It is strongly recommended that the RXMV-AH be installed to minimize the chance of water damage to the structure in case of a water leak in the unit.

C. LOCATION CONSIDERATIONS

The metal parts of this unit may be subject to rust or deterioration in adverse environmental conditions. This oxidation could shorten the equipment’s useful life. Salt spray, fog or mist in seacoast areas, sulphur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

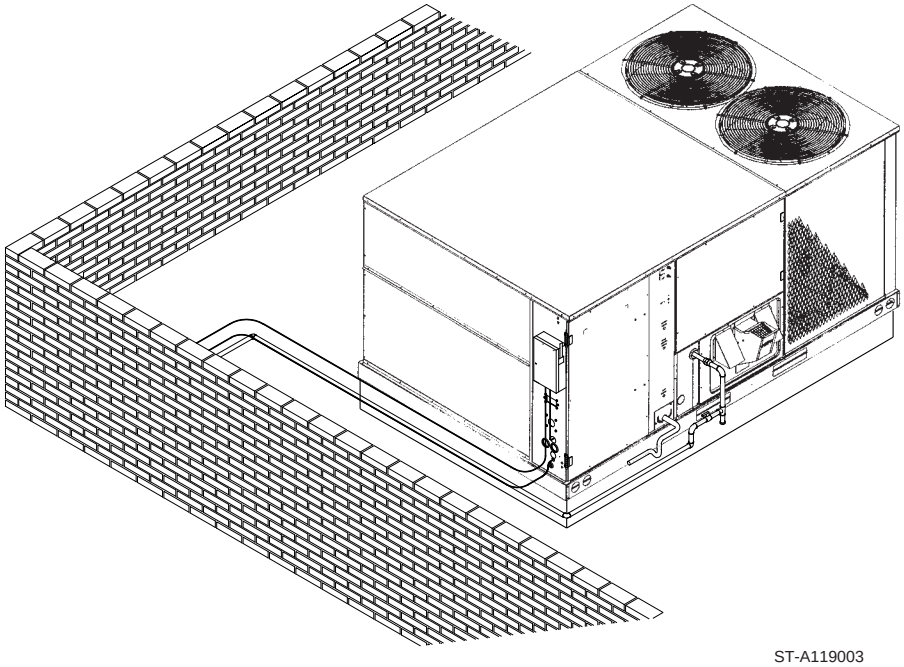
If the unit is to be installed in an area where contaminants are likely to be a problem, give special attention to the equipment location and exposure.

1. In coastal areas locate the unit on the side of the building away from the waterfront.

⚠ WARNING

DISCONNECT ALL POWER TO UNIT BEFORE STARTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH. REGULAR MAINTENANCE WILL REDUCE THE BUILDUP OF CONTAMINANTS AND HELP TO PROTECT THE UNIT’S FINISH.

FIGURE 4
ROOFTOP INSTALLATION



ST-A119003

⚠ WARNING

THESE UNITS ARE DESIGNED CERTIFIED FOR OUTDOOR INSTALLATION ONLY. INSTALLATION INSIDE ANY PART OF A STRUCTURE CAN RESULT IN INADEQUATE UNIT PERFORMANCE AS WELL AS PROPERTY DAMAGE. INSTALLATION INSIDE CAN ALSO CAUSE RECIRCULATION OF FLUE PRODUCTS INTO THE CONDITIONED SPACE RESULTING IN PERSONAL INJURY OR DEATH.

2. Frequent washing of the cabinet, fan blade and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.
3. Regular cleaning and waxing of the cabinet with an automobile polish will provide some protection.
4. A liquid cleaner may be used several times a year to remove matter that will not wash off with water.

Several different types of protective outdoor coil coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer.

The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

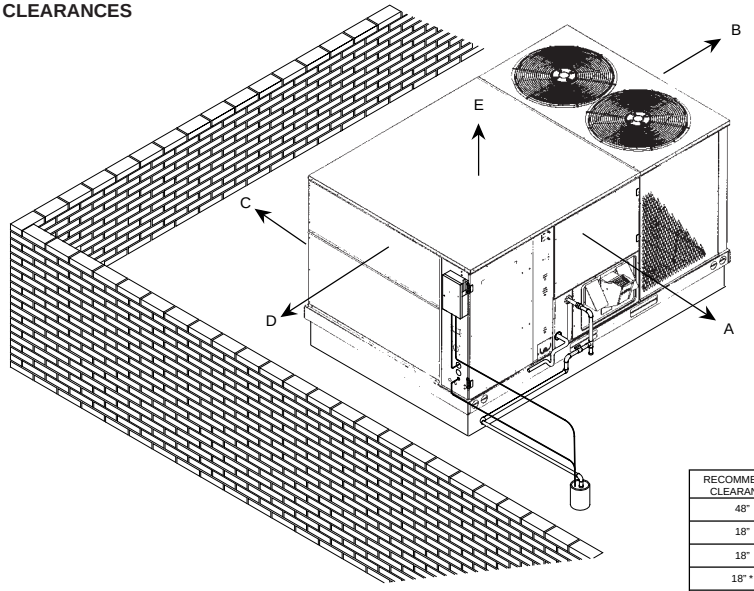
D. ATTACHING EXHAUST AND COMBUSTION AIR INLET HOODS

IMPORTANT: Do not operate this unit without the exhaust/combustion air inlet hood properly installed. This hood is shipped in a carton in the blower compartment inside the unit and must be attached when the unit is installed. See Figure 1.

To attach exhaust/combustion air inlet hood:

1. Remove screws securing blower access panel and remove access panel. For location of blower access panel, see Figure 1.
2. Remove exhaust/combustion air inlet hood from the carton, located inside the blower compartment.
3. Attach blower access panel.
4. Attach the combustion air inlet/exhaust hood with screws. Reference Figure 1 for proper location. Screws are in carton with the hood.
5. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration or addition. Consult your local utility or other authority having jurisdiction for accepted venting techniques.

FIGURE 5
CLEARANCES



RECOMMENDED CLEARANCES	LOCATION
48"	A - FRONT
18"	B - CONDENSER COIL
18"	C - DUCT SIDE
18" *	D - EVAPORTATOR END
60"	E - ABOVE
* WITHOUT ECONOMIZER 48" WITH ECONOMIZER	

ST-A119002

E. FILTER REPLACEMENT

This unit is provided with 6 - 18” X 18” X 2” disposable filters. When replacing filters, ensure they are inserted fully to the back to prevent bypass.

Recommended supplier of this filter is Glassfloss Industries, Inc. or equivalent.

G. CLEARANCES

The following minimum clearances must be observed for proper unit performance and serviceability. Reference Figure 5.

Recommended Clearance	Location
48”	A - Front
18”	B - Condenser Coil
18”	C - Duct Side
18”*	D - Evaporator End
60”	E - Above
*Without Economizer. 48” With Economizer	

H. ROOFTOP INSTALLATION

1. Before locating the unit on the roof, make sure that the roof structure is adequate to support the weight involved. (See Electrical & Physical Tables in this manual.) **THIS IS VERY IMPORTANT AND THE INSTALLER’S RESPONSIBILITY.**
2. For rigging and roofcurb details, see Figures 7 and 8.
3. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

IMPORTANT: *If unit will not be put into service immediately, block off supply and return air openings to prevent excessive condensation.*

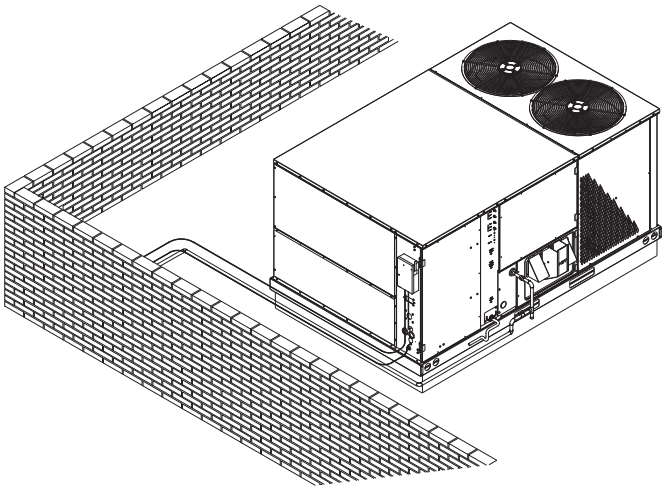
I. DUCTING

The installing contractor should fabricate ductwork in accordance with local codes. Use industry manuals as a guide when sizing and designing the duct system. Contact Air Conditioning Contractors of America, 1513 16th St. N.W., Washington, D.C. 20036.

⚠ WARNING

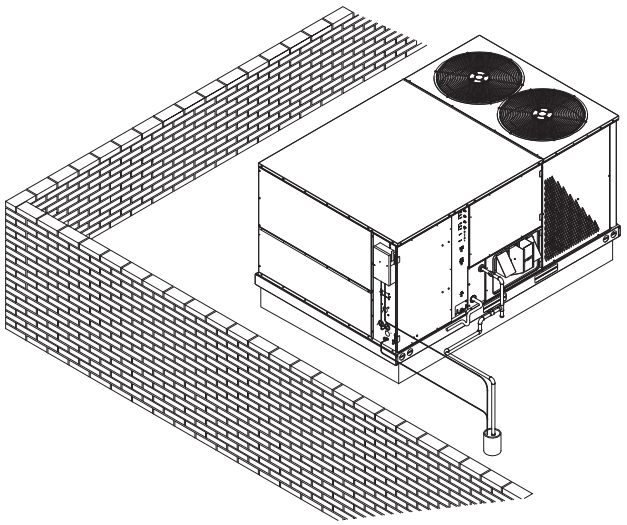
DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN DUCTWORK TO ANY OTHER HEAT PRODUCING DEVICE SUCH AS FIREPLACE INSERT, STOVE, ETC. UNAUTHORIZED USE OF SUCH DEVICES MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

FIGURE 6A
FLAT ROOFTOP INSTALLATION, ATTIC OR DROP CEILING DISTRIBUTING SYSTEM. MOUNTED ON ROOFCURB. CURB MUST BE LEVEL.



ST-A1111-03

FIGURE 6B
FLAT ROOFTOP INSTALLATION, ATTIC OR DROP CEILING DISTRIBUTING SYSTEM. MOUNTED ON ROOFCURB. CURB MUST BE LEVEL.



ST-A1111-03

Place the unit as close to the conditioned space as possible allowing clearances as indicated. Run ducts as directly as possible to supply and return outlets. Use of non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission is recommended.

On ductwork exposed to outside temperature and humidity, use a minimum of 2" of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2" of insulation. Half-inch to 1" thick insulation is usually sufficient for ductwork inside the air conditioned space.

Provide balancing dampers for each branch duct in the supply system. Properly support ductwork from the structure.

IMPORTANT: In the event that the return air ducts must be run through an "unconfined" space containing other fuel burning equipment, it is imperative that the user/homeowner must be informed against future changes in construction which might change this to a "confined space." Also, caution the user/homeowner against any future installation of additional equipment (such as power ventilators, clothes dryers, etc.), within the existing unconfined and/or confined space which might create a negative pressure within the vicinity of other solid, liquid, or gas fueled appliances.

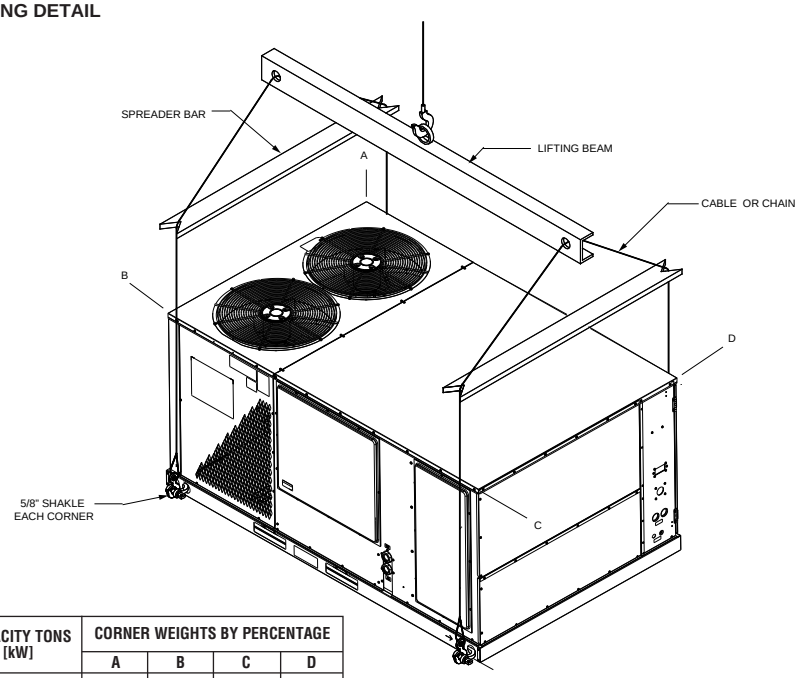
J. RETURN AIR

⚠ WARNING

NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. ALL OTHER DUCT JOINTS MUST BE SECURED WITH APPROVED CONNECTIONS AND SEALED AIRTIGHT.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

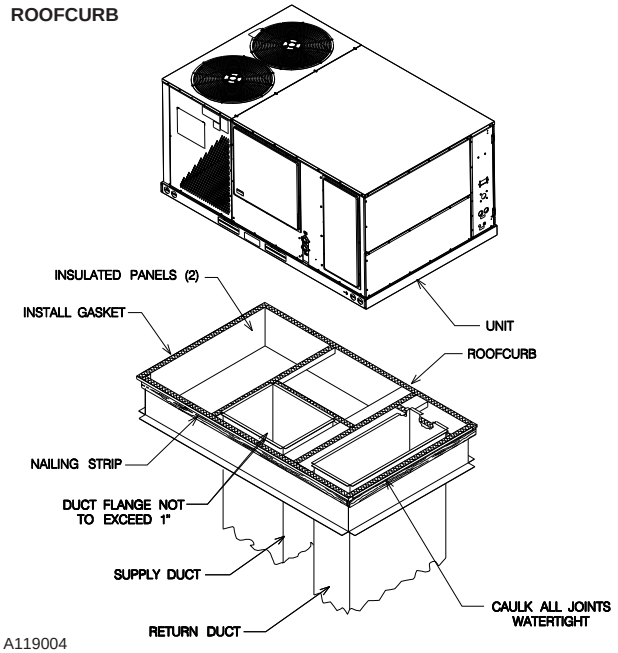
FIGURE 7
LIFTING DETAIL



CAPACITY TONS [kW]	CORNER WEIGHTS BY PERCENTAGE			
	A	B	C	D
10 [35.2]	29%	24%	21%	26%

A119005

FIGURE 8
ROOFCURB



A119004

III. GAS SUPPLY, CONDENSATE DRAIN AND PIPING

A. GAS CONNECTION

IMPORTANT: *Connect this unit only to gas supplied by a commercial utility.*

1. Install gas piping in accordance with local codes and regulations of the local utility company. In the absence of local codes, the installation must conform to the specifications of the National Fuel Gas Code, ANSI Z223.1 - latest edition.

   NOTE: The use of flexible gas connectors is not permitted.

2. Connect the gas line to the gas valve supplied with unit. Routing can be through the gas pipe opening shown in Figures 4 or 6 or through the base as shown in Figure 12.
3. Size the gas line to the furnace adequate enough to prevent undue pressure drop and never less than 1/2".
4. Install a drip leg or sediment trap in the gas supply line as close to the unit as possible.
5. Install an outside ground joint union to connect the gas supply to the control assembly at the burner tray.
6. Gas valves have been factory installed. Install a manual gas valve where local codes specify a shut-off valve outside the unit casing. (See Figure 9.)
7. Make sure piping is tight. **A pipe compound resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.**
8. IMPORTANT: any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

IMPORTANT: *Disconnect the furnace and its individual shutoff valve from the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 pound per square inch gauge or isolate the system from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of this gas supply system at pressures equal to or less than 1/2 PSIG.*

TO CHECK FOR GAS LEAKS, USE A SOAP AND WATER SOLUTION OR OTHER APPROVED METHOD. DO NOT USE AN OPEN FLAME.

⚠ WARNING

DO NOT USE AN OPEN FLAME TO CHECK FOR LEAKS. THE USE OF AN OPEN FLAME CAN RESULT IN FIRE, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IMPORTANT: *Check the rating plate to make certain the appliance is equipped to burn the type of gas supplied. Care should be taken after installation of this equipment that the gas control valve not be subjected to high gas supply line pressure.*

In making gas connections, avoid strains as they may cause noise and damage the controls. A backup wrench is required to be used on the valve to avoid damage.

The capacities of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas) are shown in Table 1.

After determining the pipe length, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

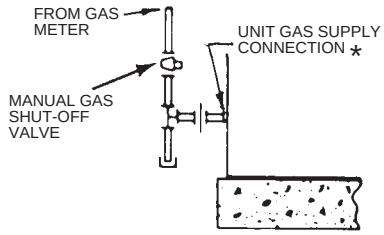
The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT^3) may be determined by consulting the local natural gas utility or the L.P. gas supplier.

TABLE 1
GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Nominal Iron Pipe Size, Inches	Equivalent Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
½	132	92	73	63	56	50	46	43
¾	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1¼	1,050	730	590	500	440	400	370	350
1½	1,600	1,100	890	760	670	610	560	530

FIGURE 9
SUGGESTED GAS PIPING

ROOF OR GROUND LEVEL INSTALLATION



*Factory supplied grommet must be utilized.

B. LP CONVERSION

⚠ WARNING

THIS UNIT IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

Convert the unit to use liquefied petroleum (LP) gas by replacing with the gas valve supplied in the conversion kit. The LP gas valve maintains the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit.

IMPORTANT: To remove the natural gas valve, remove the four screws securing the manifold pipe to the burner tray. Remove the manifold pipe with gas valve attached.

NOTE: Order the correct LP conversion kit from the furnace manufacturer. ***See Conversion Kit Index shipped with unit for proper LP kit number. Furnace conversion to LP gas must be performed by a qualified technician.***

C. ADJUSTING OR CHECKING FURNACE INPUT

– Natural Gas Line Pressure 5” - 10.5” W.C.
– LP Gas Line Pressure 11” - 13” W.C.

– Natural Gas Manifold Pressure 3.5” W.C
– LP Gas Manifold Pressure - 10” W.C.

Supply and manifold pressure taps are located on the gas valve body 1/8” N.P.T. and on the manifold.

Use a properly calibrated manometer gauge for accurate gas pressure readings.

Only small variations in the gas flow should be made by means of the pressure regulator adjustment. Furnaces functioning on LP gas must be set by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10” W.C. at the gas control valve.

To adjust the pressure regulator, remove the regulator cap and turn the adjustment screw clock-

TABLE 2
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	393	315	267	237	217	196	182	173	162	146	132
1	1,071	732	590	504	448	409	378	346	322	307	275	252
1-1/4	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511
1-1/2	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787
2	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4” IPS required.

TABLE 3

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS

INPUT BTU/HR	METER SIZE CU. FT.	HEATING VALUE OF GAS BTU PER CU. FT.									
		900		1000		1040		1100		2500	
		MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.
150,000	ONE		21.6		24.0		25.0		26.4	1	0.0
	TEN	3	36	4	0	4	10	4	24	10	0
220,000	ONE		14.7		16.4		17.0		18.0		40.9
	TEN	2	28	2	44	2	51	3	0	6	50
250,000	ONE		13.0		14.4		15.0		15.8		36.0
	TEN	2	10	2	24	2	30	2	39	6	0

wise to increase pressure or counterclockwise to decrease pressure. **Then replace the regulator cap securely.**

Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off the manual main gas valve and remove the gas manifold.

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), see conversion kit index 92-21519-XX for derating and orifice spud sizes.

Check of input is important to prevent over-firing of the furnace beyond its design-rated input. Never set input above that shown on the rating plate. Use the following table or formula to determine input rate.

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Heating Value of Gas (BTU/Cu. Ft.) x 3600}}{\text{Time in Seconds (for 1 Cu. Ft.) of Gas}}$$

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.

important note for altitudes above 2,000 feet (610 meters): The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2,000 feet in the USA or Canada, or for elevations of 2,000 - 4,500 feet (610 -1,373 meters) in Canada if the unit has been derated at the factory. For elevations above 2,000 feet (610 meters) **IN THE USA ONLY** (see ANSI-Z223.1), the burner orifices must be sized to reduce the input 4% for each 1,000 feet (305 meters) above sea level.

NOTICE: DERATING OF THE HEATING INPUT FOR HIGH ALTITUDE IN THE FIELD IS UNLAWFUL IN CANADA (REFER TO CAN/CGA 2.17). UNITS INSTALLED IN ALTITUDES GREATER THAN 2,000 FEET (610 METERS) MUST BE SHIPPED FROM THE FACTORY OR FROM A FACTORY AUTHORIZED CONVERSION STATION WITH THE HEATING INPUT DERATED BY 10% SO AS TO OPERATE PROPERLY IN ALTITUDES FROM 2,000 - 4,500 FEET (610 - 1,373 METERS).

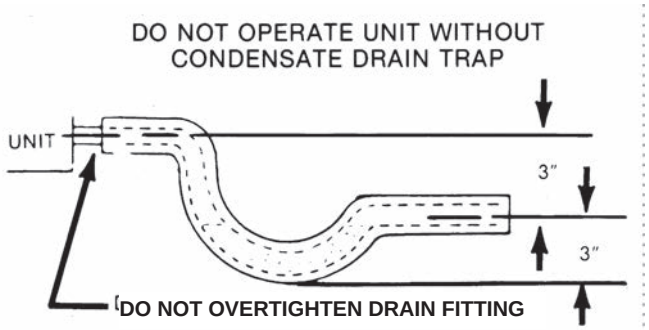
D.CONDENSATE DRAIN

IMPORTANT: *Install a condensate trap to ensure proper condensate drainage. See Figure 10.*

The condensate drain pan has a threaded female 1 inch NPT (11.5 TPI) connection. Consult local codes or ordinances for specific requirements of condensate drain piping and disposal.

- To use the removable drain pan feature of this unit, some of the condensate line joints should be assembled for easy removal and cleaning.
- Use a thin layer of Teflon tape or paste on drain pan connections and install only hand tight.
- Do not over tighten drain pan connectioins as damage to the drain pan may occur.
- Drain line MUST NOT block service access panels.
- Drain line must be no smaller than drain pan outlet and adequately sized to accommodate the condensate discharge from the unit.
- Drain line should slope away from unit a minimum of 1/8” per foot to ensure proper drainage.
- Drain line must be routed to an acceptable drain or outdoors in accordance with local codes.

FIGURE 10
CONDENSATE DRAIN



- Do not connect condensate drain line to a closed sewer pipe.
- Drain line may need insulation or freeze protection in certain applications.

IV. WIRING

A.POWER SUPPLY

⚠ WARNING

TURN OFF THE MAIN ELECTRICAL POWER AT THE BRANCH CIRCUIT DISCONNECT CLOSEST TO THE UNIT BEFORE ATTEMPTING ANY WIRING. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

1. **All wiring should be made in accordance with the National Electrical Code.** Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to the unit's RATED VOLTAGE REQUIREMENT. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C., C.E.C. or local codes.
2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On three phase units, phases must be balanced within 3%.
3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 1 using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable in Table 4 from the unit disconnect to unit.
4. For through the base wiring entry reference **Figure 12.** All fittings and conduit are field supplied for this application. Reference the chart with **Figure 12** for proper hole and conduit size.

NOTES:

1. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from this table using the circuit ampacity found on the unit rating plate. From the unit disconnect to unit, the smallest wire size allowable in Table 1 may be used, as the disconnect must be in sight of the unit.
2. Wire size based on 75°C rated wire insulation for 1% voltage drop.
3. For more than 3 conductors in a raceway or cable, see the N.E.C. (C.E.C. in Canada) for derating the ampacity of each conductor.

IMPORTANT: THIS UNIT IS APPROVED FOR USE WITH COPPER CONDUCTORS ONLY CONNECTED TO UNIT CONTACTOR.

WARRANTY MAY BE JEOPARDIZED IF ALUMINUM WIRE IS CONNECTED TO UNIT CONTACTOR.

TABLE 4

AWG Copper Wire Size	AWG Aluminum Wire Size	Connector Type and Size (or equivalent)	
#12	#10	T & B Wire Nut	PT2
#10	# 8	T & B Wire Nut	PT3
# 8	# 6	Sherman Split Bolt	TSP6
# 6	# 4	Sherman Split Bolt	TSP4
# 4	# 2	Sherman Split Bolt	TSP2

Special instructions apply for power wiring with aluminum conductors: Warranty is void if connections are not made per instructions.

Attach a length (6" or more) of recommended size copper wire to the unit contactor terminals L1, L2 and L3 for three phase.

Select the equivalent aluminum wire size from the tabulation below:

Splice copper wire pigtails to aluminum wire with U.L. recognized connectors for copper-aluminum splices. Please exercise the following instructions very carefully to obtain a positive and lasting connection:

1. Strip insulation from aluminum conductor.
2. Coat the stripped end of the aluminum wire with the recommended inhibitor, and wire brush the aluminum surface through inhibitor. INHIBITORS: Brundy-Pentex "A"; Alcoa-No. 2EJC; T & B-KPOR Shield.
3. Clean and recoat aluminum conductor with inhibitor.
4. Make the splice using the above listed wire nuts or split bolt connectors.
5. Coat the entire connection with inhibitor and wrap with electrical insulating tape.

B. HOOK-UP

To wire unit, refer to the following hook-up diagram.

Refer to Figure 1 for location of wiring entrances.

Wiring to be done in the field between the unit and devices not attached to the unit, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise (35°C)] when installed in accordance with the manufacturer's instructions.

C. INTERNAL WIRING

A diagram of the internal wiring of this unit is located on the inside of control access panel and in this manual. If any of the original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be same as original wiring.

Transformer is factory wired for 230 volts on 208/230 volt models and must be changed for 208 volt applications. See unit wiring diagram for 208 volt wiring.

D. THERMOSTAT

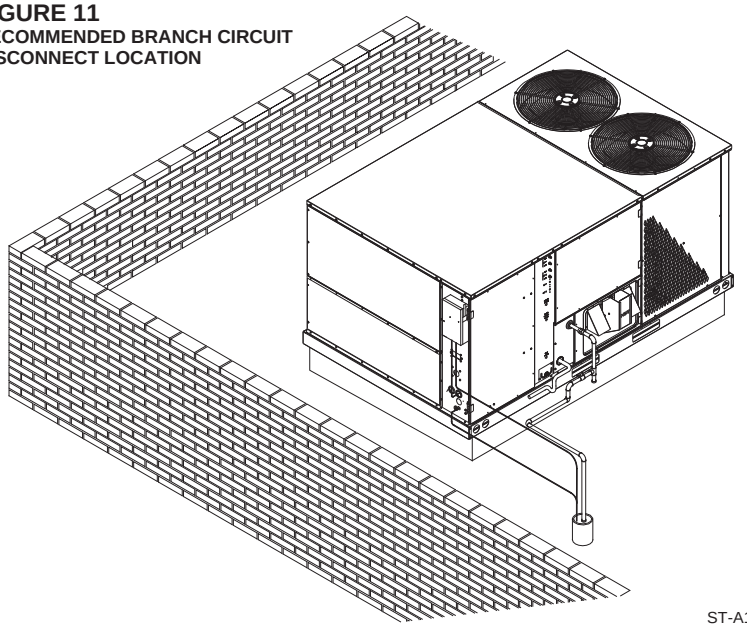
The room thermostat must be compatible with the spark ignition control on the unit. Generally, all thermostats that are not of the "current robbing" type are compatible with the integrated furnace control. The low voltage wiring should be sized as shown in Table 1.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires through control entry opening (Figure 1 or Figure 12) and connect to the low voltage thermostat connections (see wiring diagram).

TABLE 5

UNIT MCA	COPPER WIRE SIZE—AWG					
	SUPPLY WIRE LENGTH—FEET					
	50	100	150	200	250	300
20	10	8	6	4	4	4
25	10	8	6	4	4	3
30	8	6	4	4	3	2
35	8	6	4	3	2	1
40	8	6	4	3	2	1
45	8	4	3	2	1	1/0
50	6	4	3	2	1	1/0
60	6	4	2	1	1/0	2/0
70	4	3	2	1/0	2/0	3/0
80	4	3	1	1/0	2/0	3/0
90	3	2	1/0	2/0	3/0	4/0
100	3	2	1/0	2/0	3/0	4/0
110	2	1	2/0	3/0	4/0	250
125	1	1	2/0	3/0	4/0	25

FIGURE 11
RECOMMENDED BRANCH CIRCUIT DISCONNECT LOCATION



ST-A1111-03

FIGURE 12

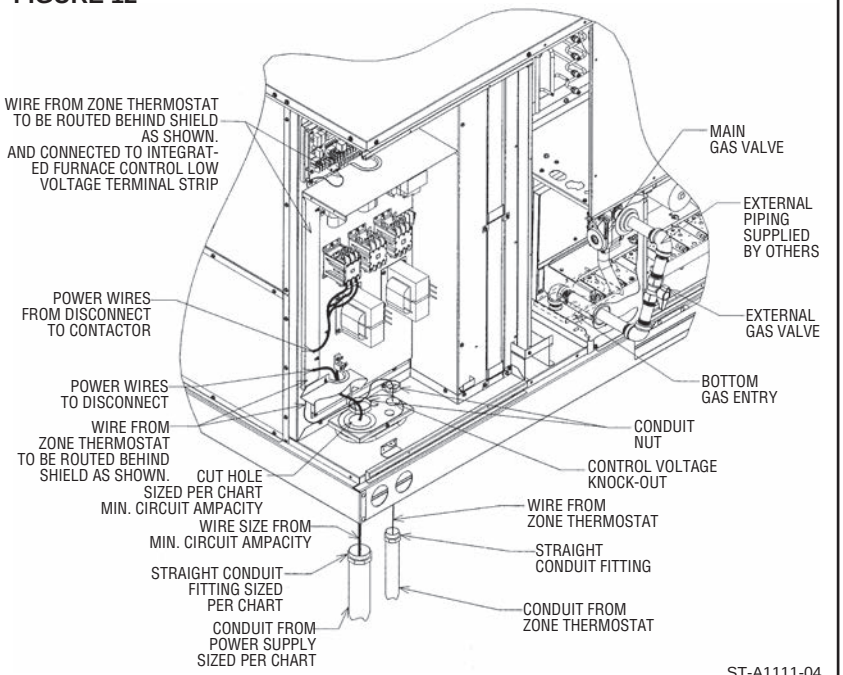
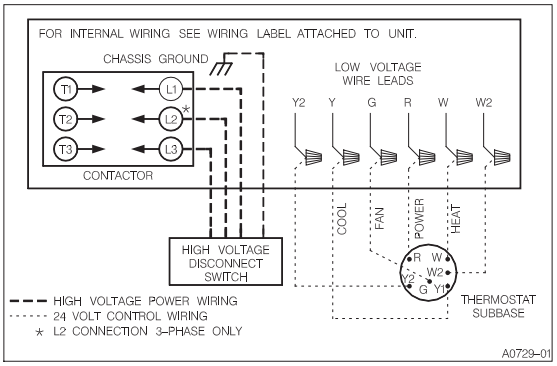


FIGURE 13
TYPICAL THERMOSTAT WIRING



	WIRE SIZE, AWG											
	14	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1**	**0**	**00**	**000**
CONDUIT SIZE	1/2”	1/2”	1/2”	3/4”	1”	1”	1-1/4”	1-1/4”	1-1/2”	1-1/2”	2”	2”
HOLE SIZE	7/8”	7/8”	7/8”	1-31/32”	1-23/64”	1-23/64”	1-23/32”	1-23/32”	1-31/32”	1-31/32”	2-15/32”	2-15/32”

NOTES: 1. DETERMINE REQUIRED WIRE SIZE FROM MINIMUM CIRCUIT AMPACITY SHOWN IN INSTALLATION & OPERATING INSTRUCTION.
2. BOTTOM POWER ENTRY WILL NOT ACCOMMODATE WIRE LARGER THAN #2 AWG (SHADED AREA).

Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for “heater” selection or adjustment.

The following is a list of recommended thermostats to be used with or without an economizer:

TABLE 6

FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS							
		SOLID COPPER WIRE - AWG.					
Thermostat Load - Amps	3.0	16	14	12	10	10	10
	2.5	16	14	12	12	12	10
	2.0	18	16	14	12	12	10
		50	100	150	200	250	300
		Length of Run – Feet (1)					

(1) The total wire length is the distance from the furnace to the thermostat and back to the furnace.

NOTE: DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

V. WATER CONNECTIONS AND START UP FOR POTABLE WATER HEATING

A. WATER PIPING

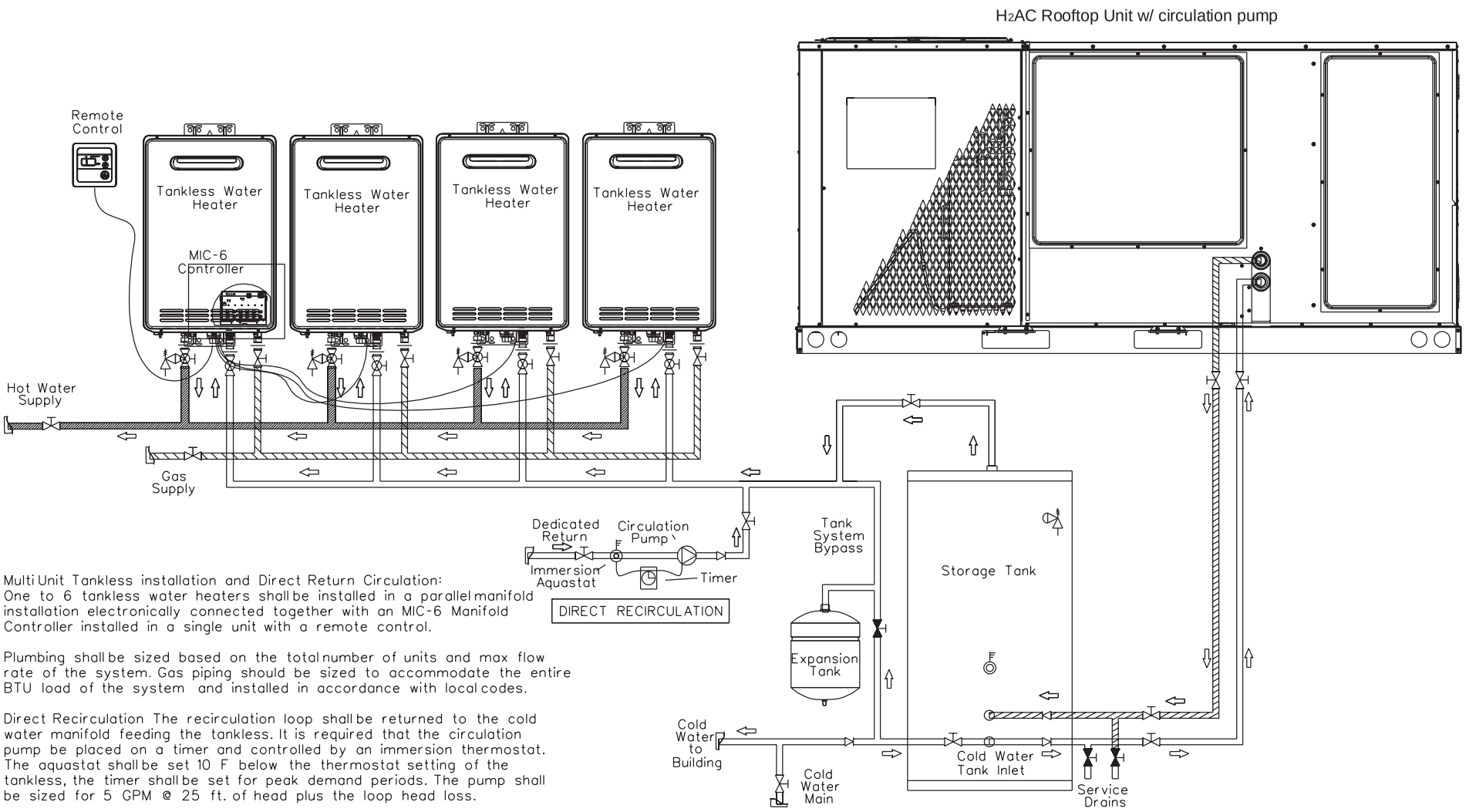
1. Use of copper pipe suitable for potable water is recommended. Plumbing must meet applicable national and local plumbing and building codes.
2. The H_2AC rooftop unit should be installed as close to the storage tank as possible to minimize heat loss from interconnecting piping.
3. Use only solder, brazing, and pipe thread sealing materials approved for potable water systems.
4. Refer to connection diagram for typical piping, storage tank, and valve configurations.
5. **It is highly recommended that the H_2AC rooftop unit be installed with isolation/flushing valves (see illustration, Webstone #41436 or similar) on the inlet and outlet water connections to facilitate required periodic lime and scale removal from the water-to-refrigerant heat exchanger.**
6. Maximum equivalent length of water piping is to be in accordance with the procedure shown in this manual. Consult the pressure loss tables for the values associated with the required water fittings, valves, and straight lengths.
7. Use the H_2AC Water Flowrate vs. Water Pressure Drop graph to verify that total system equivalent piping length will not result in less than the 15 GPM minimum flow rate.

B. SYSTEM PRESSURE TEST AND START UP

1. Pressure test system complete system after all plumbing connections are made using accepted plumbing leak test procedures.
2. **The refrigerant-to-water heat exchanger and water pump housing will contain a small amount of non-toxic RV-type water system anti-freeze left over from the factory run test. Be certain to flush the unit and all connecting piping with fresh water prior to start up and initial use.**
3. Verify that air bleed valve in blower section on H_2AC rooftop unit is open during initial filling with water. Air must be bled from the highest point in the system. If unit installation results in a higher point than the integral air bleed valve, an additional valve needs to be installed at that point.
4. Start unit and verify the correct sequence of operation.

FIGURE 14
ISOLATION/FLUSHING VALVE





Multi Unit Tankless installation and Direct Return Circulation:
One to 6 tankless water heaters shall be installed in a parallel manifold installation electronically connected together with an MIC-6 Manifold Controller installed in a single unit with a remote control.

Plumbing shall be sized based on the total number of units and max flow rate of the system. Gas piping should be sized to accommodate the entire BTU load of the system and installed in accordance with local codes.

Direct Recirculation The recirculation loop shall be returned to the cold water manifold feeding the tankless. It is required that the circulation pump be placed on a timer and controlled by an immersion thermostat. The aquastat shall be set 10 F below the thermostat setting of the tankless, the timer shall be set for peak demand periods. The pump shall be sized for 5 GPM @ 25 ft. of head plus the loop head loss.

Legend

- Cold Water Isolator Valve Assembly
- Hot Water Isolator Valve Assembly
- Pressure Relief Valve
- Circulation Pump
- Normally Open Shut-off Valve
- Normally Closed Shut-off Valve
- Check Valve
- Union
- Gas Pipe
- Cold Water Pipe
- Hot Water Pipe
- Return Circulation Line

This drawing is intended as a guide only. It is not to be used as an alternative to a professionally engineered project drawing. This drawing does not imply compliance with local building codes. Installation may vary, depending on installation location, and must be done in accordance with all local building codes. Consult with local building officials prior to installation.

PROCEDURE FOR CALCULATING THE TOTAL EQUIVALENT LENGTH OF TUBING

List all piping components from the storage tank to the H_2AC rooftop unit and back again. The equivalent length of straight tubing is the same as the actual length. The equivalent length of fittings are obtained from the table below. Sum all of the individual component lengths to find the Total Equivalent Length.

***Pressure Loss in Fittings and Valves Expressed as Equivalent Length of Tube, feet**

Nominal or Standard Size, in		1-1/2"	2"
Fittings	Standard 90° Elbow	4	5.5
	Standard 45° Elbow	1.5	2
	90° Tee - Side Branch	7	9
	90° Tee - Straight Run	0.5	0.5
	Coupling	0.5	0.5
Valves	Ball	0.5	0.5
	Gate	—	0.5
	Btfly	—	7.5
	Check	6.5	9

No.Inlet		EQUIV. Length (ft.)	No.Outlet		EQUIV. Length (ft.)
1	side branch Tee	7.0	18	straight tubing	1
2	straight tubing	1.0	19	90° elbow	4.0
3	Check valve	6.5	20	straight tubing	0.5
4	straight tubing	0.5	21	1-1/2" MPT adapter ①	1
5	straight run Tee	0.5	22	Ball Isolation valve	0.5
6	straight tubing	1.5	23	1-1/2" MPT adapter ①	1.0
7	Ball valve	0.5	24	straight tubing	20.0
8	straight tubing	5.0	25	coupling	0.5
9	90° elbow	4.0	26	straight tubing	19.6
10	straight tubing	20.0	27	90° elbow	4.0
11	coupling	0.5	28	straight tubing	4.0
12	straight tubing	20.0	29	Ball valve	0.5
13	1-1/2" MPT adapter ①	1.0	30	straight tubing	1.5
14	Ball Isolation valve	0.5	31	straight run Tee	0.5
15	1-1/2" MPT adapter ①	1.0	32	straight tubing	0.5
16	straight tubing	0.5	33	Check valve	6.5
17	90° elbow - fitting	4.0	34	straight tubing	1.0
			35	90° elbow	4.0
		74.0			70.6
	Total Equivalent length	144.6 (ft.)			

*NOTES: ① For threaded fittings, double the allowances shown in the table.

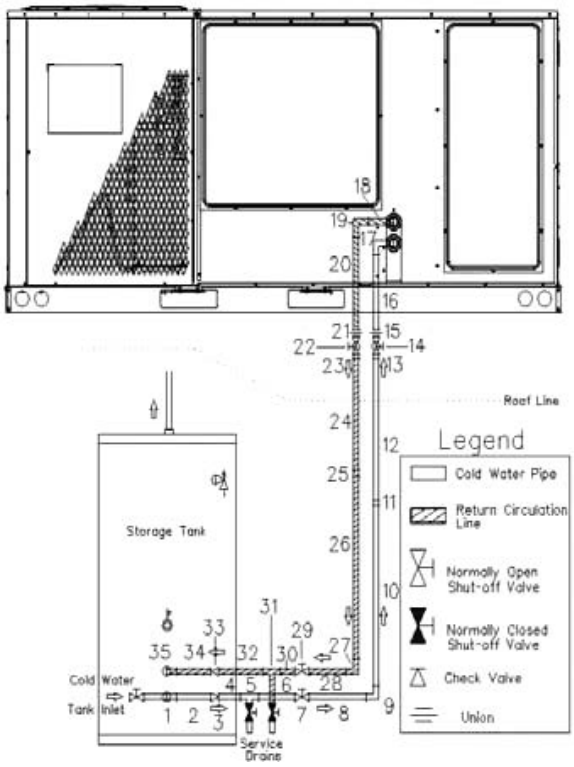
Data condensed from Table 7 of the Copper Development Organization.

Allowances are for streamlined soldered fittings and recessed threaded fittings.

The equivalent lengths presented above are based upon a C factor of 150 in the Hazen-Williams friction loss formula. The lengths shown are rounded to the nearest half foot.

In a closed system application the static (elevation) head is ignored. Only the pipe friction is used to calculate pressure drop.

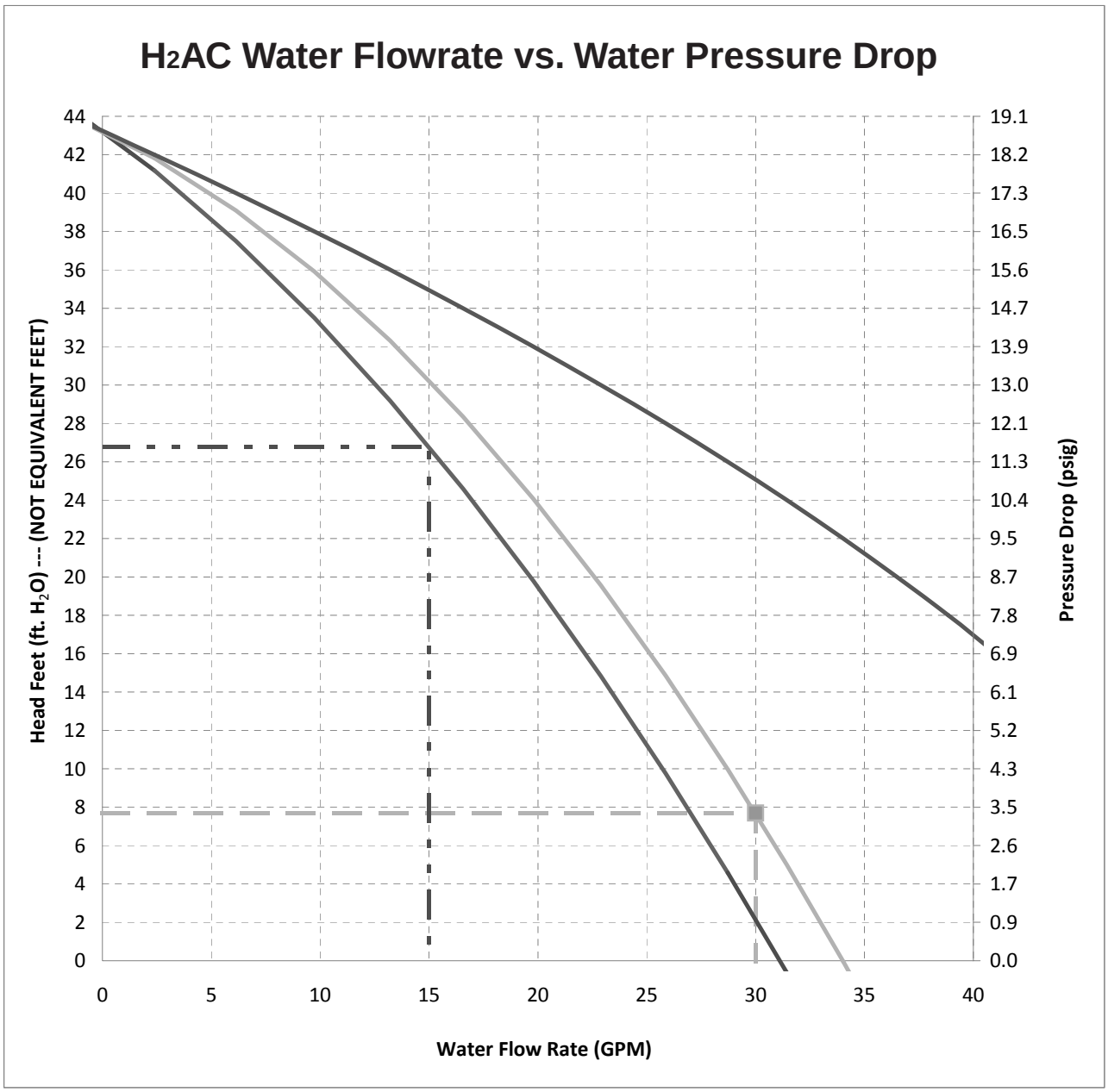
FIGURE 15



PROCEDURE FOR CALCULATING THE TOTAL EQUIVALENT LENGTH OF TUBING

List all piping components from the storage tank to the H_2AC rooftop unit and back again. The equivalent length of straight tubing is the same as the actual length. The equivalent length of fittings are obtained from the table below. Sum all of the individual coomponents lengths to find the Total Equivalent Length.

Water Flow Rate (GPM) (15 GPM minimum)		15	20	25	**30**
Water Velocity using 1-1/2" Nom. Type L Copper Tubing (fps)		2.71	3.61	4.51	5.41
Available Pressure Head at Unit @ 230/460 Volts	(Head ft.) (psig)	30.3 13.1	23.8 10.3	16.3 7.1	7.7 3.3
Maximum Equivalent Feet of 1-1/2 Nom. Type L. Copper tubing (ft.) at 230/460V		1504	695	314	106
Available Pressure Head at Unit @ 208 Units	(Head ft.) (psig)	26.8 11.6	19.5 8.4	11.3 4.9	2.2 0.9
Maximum Equivalent Feet of 1-1/2" Nom. Type L Copper Tubing (ft.) @ 208 V		1332	569	218	30



H2AC ROOFTOP UNIT SEQUENCE OF OPERATION

1. On a call for cooling ("Y" from T'stat energized), unit always starts in air-cooled condenser mode and runs for two minutes.
   a. Liquid line solenoid from water-cooled heat exchanger is energized during this time to expedite transfer of refrigerant from water-cooled condenser.
2. After two minutes water pump is energized for 60 seconds while water temperature is sampled by a thermistor.
   a. If water pressure transducer does not sense adequate pressure (5 psig), or water inlet temperature is >95°F go to step 7.
3. If water pressure transducer senses adequate pressure and water inlet temperature is <95°F, unit switches to water-cooled condenser mode*.
   a. Three-way valve is energized.
   b. Outdoor fans are switched off.
   c. Outdoor coil liquid line solenoid is energized to for two minutes to expedite return of liquid refrigerant in air-cooled condenser.
4. Unit operates in water-cooled condenser (water heating) mode until the call for cooling ends, outlet water temperature reaches 138°F, or liquid line pressure >570 psig.
5. The control will record the water inlet temperature when the refrigerant pressure reaches 550 psig. The control will use this value minus 20°F for the hybrid water inlet restart temperature.

6. If termination of a call for cooling ends the water-cooled condenser (water heating) cycle, the unit will restart as described in item 1 above on the next call for cooling.
7. If the water-cooled condenser (water heating) cycle terminates on water temperature rise (138°F) or pressure (>570 psig) and there is still a call for cooling, the unit three-way valve switches back to the air-cooled condenser mode, turns on the outdoor fans, and energizes the liquid line solenoid from the water-cooled condenser for two minutes.
8. If a cooling ("Y") call continues, return to Step 2 after a selectable delay default is ten minutes.

FAULTS/LOCKOUTS/Misc.

1. **Low-temperature lockout** - Occurs at 40°F for the water-cooled condenser (water heating) mode. Unit will only operate in the air-cooled condenser mode below 40°F.
2. **Standard DDC control lockouts** – High pressure control, low pressure control, low ambient control, etc.
3. **Three-way valve failure or water pump failure** – A rapid rise in liquid line pressure will occur. If liquid line pressure increases above 530 psig in less than one minute. If three of these trips occur during a call for cooling, a hard lockout of the water heating mode will occur, but the unit will still function in the air-cooled condenser mode.
4. **Airside solenoid valve failure** – shows up as an undercharge in the water heating mode. If subcooling is less than 4° or superheat is more than 25° after 2 minutes, 30 seconds unit will return to air cooled mode. If this happens three times in a row without a successful run of at least four minutes in the water heating mode, then a hard lockout of the water heatiing mode will occur, but the unit will still function in the air-cooled condenser mode.
5. **Freeze protection** - If ambient is <35°F, water pump is energized until ambient is >37°F.
6. **Leak detection** - If leak detector senses water, an alarm signal is sent to the thermostat and waterside operation is locked out until leak detection ends.

Misc.

1. Water pump is energized once every 24 hours to keep water from stagnating in times of no cooling operation.

VI. FURNACE SECTION CONTROLS AND IGNITION SYSTEM

NORMAL FURNACE OPERATING SEQUENCE

This unit is equipped with a two stage integrated direct spark ignition control.

NORMAL HEAT MODE

A. Call For First Stage (low fire) Only:

1. Zone thermostat contacts close, a call for first stage (low fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.
5. Control checks each low-fire pressure switch for closure.
6. If each low-fire pressure switch is closed, the control starts a 30 second prepurge. If either low-fire pressure switch is still open after 180 seconds, the high-fire inducers will be energized until closure.
7. After prepurge timeout, control initiates spark for 2 seconds minimum, 7 second maximum ignition trial, initiates 45 second, second stage (high fire) warm up timing.
8. Control detects flame, de-energizes spark and initiates 45 second delay on blower timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After the 45 second second stage warmup period control checks thermostat input. If only W1 is called for, W2 is de-energized and the control starts a 5 second off delay on the W2 inducer.
11. After fixed 5 seconds the W2 inducer is de-energized.
12. Control enters normal operating loop where all inputs are continuously checked.

B. Call For Second Stage, After First Stage Established; Starting from A.11:

1. If a call for second stage (high fire) is initiated after a call for first stage heat is established, the control energizes the W2 inducer assures the high-fire pressure switch is closed and energizes the second stage of the gas valve.
2. Control enters normal operating loop where all inputs are continuously checked.

C. Second Stage Satisfied; First Stage Still Called For; Starting From B.2:

1. Once the call for second stage is satisfied, the control starts a 30 second off delay on W2 inducer and reduces the gas valve to first stage.
2. Control enters normal operating loop where all inputs are continuously checked.

D. First Stage Satisfied:

1. Zone thermostat is satisfied.
2. Control de-energizes gas valve.
3. Control senses loss of flame.
4. Control initiates 5 second inducer postpurge and 90 second indoor blower delay off.
5. Control de-energizes inducer blower.
6. Control de-energizes indoor blower.
7. Control in the stand by mode with solid red LED.

E. First Stage and Second Stage Called Simultaneously:

1. Zone thermostat contacts close, a call for first stage (low fire) and second stage (high fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.
5. Control checks each pressure switch for closure.
6. If each low-fire pressure switch is closed, the control starts a 30 second prepurge. If either switch is still open after 180 seconds, the high-fire inducers will be energized until closure.
7. After prepurge timeout, control initiates spark for 2 seconds minimum, 7 second maximum ignition trial, and initiates 45 second second stage warm up timing.
8. Control detects flame, de-energizes spark and starts a 45 second indoor blower delay on timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After the 45 seconds second stage warmup period control checks the thermostat input. If W1 and W2 is present control enters normal operating loop where all inputs are continuously checked.

F. First Stage and Second Stage Removed Simultaneously:

1. Upon a loss of W1 and W2 the gas valve is de-energized.
2. Upon a loss of flame, each inducer will complete a 5 second postpurge and the indoor blower will complete a 90 second delay off.
3. Control in the stand by mode with solid red LED.

The integrated control is a four-ignition system.

After a total of four cycles without sensing main burner flame, the system goes into a 100% lockout mode. After one hour, the ignition control repeats the prepurge and ignition cycles for 4 tries and then go into 100% lockout mode again. It continues this sequence of cycles and lockout each hour until ignition is successful or power is interrupted. During the lockout mode, neither the ignitor or gas valve will be energized until the system is reset by turning the thermostat to the “OFF” position or interrupting the electrical power to the unit for 3 seconds or longer. The induced draft blower and main burner will shut off when the thermostat is satisfied.

The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the “ON” position.

The integrated furnace control is equipped with diagnostic LED. The LED is lit continuously when there is power to the control, with or without a call for heat. If the LED is not lit, there is either no power to the control or there is an internal component failure within the control, and the control should be replaced.

If the control detects the following failures, the LED will flash on for approximately 1/4 second, then off for 3/4 second for designated failure detections.

1 Flash: Failed to detect flame within the four tries for ignition.
2 Flash: Pressure switch or induced draft blower problem detected.
3 Flash: High limit or auxiliary limit open.
4 Flash: Flame sensed and gas valve not energized or flame sensed with no “W” signal.
5 Flash: Overtemperature switch open.

OPERATING INSTRUCTIONS

⚠ WARNING

DO NOT ATTEMPT TO MANUALLY LIGHT THIS FURNACE WITH A MATCH OR ANY OPEN FLAME. ATTEMPTING TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

This appliance is equipped with integrated furnace control. This device lights the main burners each time the room thermostat (closes) calls for heat. See operating instructions on the back of the furnace/controls access panel.

TO START THE FURNACE

1. Set the thermostat to its lowest setting.

2. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Remove control door.
5. Move control knob to the “OFF” position. Turn the knob by hand only, do not use any kind of tool.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow B in the safety information on the Operating Instructions located on the back of the controls/access panel. If you don’t smell gas, go to the next step.
7. Move the gas control knob from “OFF” position to “ON” position. Operate this appliance with the gas control knob in the “ON” position only. Do not use the gas control knob as a means for throttling the burner input rate.
8. Replace the control door.
9. Turn on all electric power to the appliance.
10. Set the thermostat to the desired setting.
11. If the appliance will not operate, follow the instructions below on how to shut down the furnace.

⚠ WARNING

THE SPARK IGNITOR AND IGNITION LEAD FROM THE IGNITION CONTROL ARE HIGH VOLTAGE. KEEP HANDS OR TOOLS AWAY TO PREVENT ELECTRICAL SHOCK. SHUT OFF ELECTRICAL POWER BEFORE SERVICING ANY OF THE CONTROLS. FAILURE TO ADHERE TO THIS WARNING CAN RESULT IN PERSONAL INJURY OR DEATH.

The initial start-up on a new installation may require the control system to be energized for some time until air has bled through the system and fuel gas is available at the burners.

TO SHUT DOWN FURNACE

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control door.
4. Move control knob to the “OFF” position.
5. Replace control door.

⚠ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN RESULT IN AN EXPLOSION OR FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH!

BURNERS

Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

MANUAL RESET OVERTEMPERATURE CONTROL

Two manual reset overtemperature controls are located on the burner shield. These devices senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

⚠ WARNING

DO NOT JUMPER THIS DEVICE! DO NOT RESET THE OVERTEMPERATURE CONTROL WITHOUT TAKING CORRECTIVE ACTION TO ASSURE THAT AN ADEQUATE SUPPLY OF COMBUSTION AIR IS MAINTAINED UNDER ALL CONDITIONS OF OPERATION. FAILURE TO DO SO CAN RESULT IN CARBON MONOXIDE POISONING OR DEATH. REPLACE THIS CONTROL ONLY WITH THE IDENTICAL REPLACEMENT PART.

PRESSURE SWITCH

This furnace has two pressure switches for sensing a blocked exhaust or a failed induced draft blower. They are normally open and close when the induced draft blower starts, indicating air flow through the combustion chamber.

LIMIT CONTROL

The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature.

⚠ WARNING

DO NOT JUMPER THIS DEVICE! DOING SO CAN CAUSE A FIRE OR EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IMPORTANT: *Replace this control only with the identical replacement part.*

VII. SYSTEM OPERATING INFORMATION

ADVISE THE CUSTOMER

1. Change the air filters regularly. The heating system operates better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This reduces the heating and cooling load on the system.
4. Avoid excessive use of exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles three feet from the unit and exhaust system.
7. ***IMPORTANT:*** *Replace all blower doors and compartment cover after servicing the unit. Do not operate the unit without all panels and doors securely in place.*
8. Do not allow snow or other debris to accumulate in the vicinity of the appliance.

FURNACE SECTION MAINTENANCE

The unit's furnace should operate for many years without excessive scale build-up in flue passageways; however, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the exhaust system and the burners for continued safe operation, paying particular attention to deterioration from corrosion or other sources.

If during inspection the flue passageways and exhaust system are determined to require cleaning, the following procedures should be followed **(by a qualified installer, service agency, or gas supplier):**

1. **Turn off the electrical power to the unit and set the thermostat to the lowest temperature.**
2. **Shut off the gas supply to the unit either at the meter or at manual valve in the supply piping.**

⚠ WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

3. Remove the furnace controls access panel and the control box cover.
4. Disconnect the gas supply piping from the gas valve.
5. Disconnect the wiring to the induced draft blower motor, gas valve, flame sensor, and flame roll-out control, and ignitor cable. **Mark all wires disconnected for proper reconnection**.
6. Remove the screws (4) connecting the burner tray to the heat exchanger mounting panel.
7. Remove the burner tray and the manifold assembly from the unit.
8. Remove the screws (10) connecting the two induced draft blowers to the collector box and screws (12) connecting the inducer mounting plate to the heat exchanger center panel. Remove the induced draft blower and the collector box from the unit.
9. Remove the turbulators from inside the heat exchangers by inserting the blade of a screwdriver under the locking tabs. Pop the tabs out of the expanded grooves of the heat exchanger. Slide the turbulators out of the heat exchangers.
10. Direct a water hose into the outlet of the heat exchanger top. Flush the inside of each heat exchanger tube with water. Blow out each tube with air to remove excessive moisture.
11. Reassemble (steps 1 through 9 in reverse order). **Be careful not to strip out the screw holes used to mount the collector box and inducer blower. Replace inducer blower gasket and collector box gasket with factory replacements if damaged.**

⚠ WARNING

HOLES IN THE EXHAUST TRANSITION OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME. THE EXHAUST TRANSITION OR HEAT EXCHANGER MUST BE REPLACED IF THEY HAVE HOLES OR CRACKS IN THEM. FAILURE TO DO SO CAN CAUSE CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

The manufacturer recommends that a qualified installer, service agency or the gas supplier visually inspect the burner flames for the desired flame appearance at the beginning of the heating season and approximately midway in heating season.

The manufacturer also recommends that a qualified installer, service agency or the gas supplier clean the flame sensor with steel wool at the beginning of the heating season.

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING MAINTENANCE. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK OR SEVERE PERSONAL INJURY OR DEATH.

LUBRICATION

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are prelubricated by the manufacturer and do not require further attention.

A qualified installer, service agency or the gas supplier must periodically clean the motors to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict air flow and the motor depends upon sufficient air flowing across and through it to prevent overheating.

COOLING SECTION MAINTENANCE

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

It is recommended that at the beginning of each cooling season a qualified installer or service agency inspect and clean the cooling section of this unit. The following areas should be addressed: evaporator coil. condenser coil, condenser fan motor and venturi area.

To inspect the evaporator coil:

1. Open the control/filter access panel and remove filters. Also, remove blower access panel. In downflow applications remove the horizontal return to gain access.

⚠ WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING THE UNIT. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

2. Shine a flashlight on the evaporator coil (both sides) and inspect for accumulation of lint, insulation, etc.
3. If coil requires cleaning, follow the steps shown below.

Cleaning Evaporator Coil

1. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
2. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
3. Inspect the drain pan and condensate drain at the same time the evaporator coil is checked. Clean the drain pan by flushing with water and removing any matters of obstructions which may be present.
4. Go to next section for cleaning the condenser coil.

Cleaning Condenser Coil, Condenser Fan, Circulation Air Blower and Venturi

1. Remove the compressor access panel. Disconnect the wires to the condenser fan motor in the control box (see wiring diagram).
2. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.

3. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
4. The venturi should also be inspected for items of obstruction such as collections of grass, dirt or spider webs. Remove any that are present.
5. Inspect the circulating air blower wheel and motor for accumulation of lint, dirt or other obstruction and clean it necessary. Inspect the blower motor mounts and the blower housing for loose mounts or other damage. Repair or replace if necessary.

Re-assembly

1. Reconnect fan motor wires per the wiring diagram attached to the back of the cover.
2. Close the filter control and replace the blower/evaporator coil access panels.
3. Replace the control box cover.
4. Restore electrical power to the unit and check for proper operation, especially the condenser fan motor.

VIII. WATER HEATING SECTION MAINTENANCE

LIME AND SCALE FLUSHING PROCEDURE

Periodic flushing is required for the refrigerant-to-water heat exchanger contained in the Rheem H_2AC rooftop unit to remove lime and scale buildup and to prevent degradation of water heating performance. How often this is required depends on the hardness of the water in your area and the run time in the water heating mode. The below instructions provide a safe and effective means of removing the lime and scale buildup in the heat exchanger. If you are not comfortable with the procedure, seek out the assistance of a plumbing professional.

This procedure assumes that isolation/flushing valves have been installed on the unit water inlet and outlet connections. If the unit was installed without valves, it is recommended that flushing be performed by a plumbing professional.

Required items:

- Five gallon bucket
- Small circulation pump
- Hoses with connections suitable for the unit drain valves and pump.
- 2-3 gallons of food-grade white vinegar.
- **The bucket, pump, and hoses can be ordered as Rheem flush kit RTG20124.**

Instructions:

1. Turn off the electric supply to the unit.
2. Shut off the water supply to the unit using the isolation ball valves. Consult the valve manufacturer's instructions for specifics in using their valve assemblies.
3. Attach a short hose to the threaded fittings on each drain valve. Connect the hose on the inlet valve to the outlet of a small circulation pump.
4. Pour approximately two to three gallons of food-grade white vinegar into the pail.
5. Place the inlet hose from the pump and the drain hose from the outlet valve on the unit into the pail.
6. Open the drain valves and turn on the pump. Allow the vinegar solution to circulate for 45-60 minutes.
7. Turn off pump and drain vinegar from the heat exchanger. Close the inlet water drain valve.
8. Open the inlet water supply shutoff valve and allow fresh water to flush the heat exchanger for at least five minutes to remove all traces of vinegar from the system.
9. Close the outlet water drain valve and open the outlet water supply shut-off valve.
10. Restore electrical power and verify correct unit operation.

FIGURE 16
ISOLATION/FLUSHING VALVE (WEBSTONE #41436 OR SIMILAR)



REPLACEMENT PARTS

Contact your local distributor for a complete parts list.

TROUBLESHOOTING

Refer to Figures 17, 18 and 19 for determining cause of unit problems.

WIRING DIAGRAMS

Wiring diagrams for the unit and its power sources are in the back of this booklet and are also located on the control access panel.

CHARGING

See Figure 24 for proper charging information.

TABLE 7 - AIR-FLOW PERFORMANCE – 10 TON RKHL C120 MODELS

Air Flow CFM [L/s]	Capacity 10 Ton [35.2 kW]																																										
	External Static Pressure—Inches of Water [kPa]																																												
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]		2.1 [.52]		2.2 [.55]		2.3 [.57]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
3200 [1510]	—	—	—	—	—	—	657	1170	715	1245	742	1319	770	1394	797	1468	825	1543	852	1617	880	1692	956	1698	976	1703	996	1817	1017	1930	1037	2044	1057	2157	1077	2271	1098	2384	1118	2498	1138	2611	1159	2725	1179	2838
3300 [1557]	—	—	—	—	673	1179	701	1253	728	1328	756	1402	783	1477	811	1551	838	1626	866	1700	943	1705	963	1708	948	1822	976	1935	1024	2049	1044	2162	1065	2276	1085	2390	1105	2503	1125	2617	1146	2730	1166	2844	1186	2957
3400 [1605]	—	—	—	—	687	1261	714	1336	742	1410	769	1485	797	1559	824	1634	852	1708	879	1763	950	1811	971	1827	962	1941	989	2054	1032	2168	1052	2281	1072	2395	1092	2508	1113	2622	1133	2735	1153	2849	1174	2962	1194	3076
3500 [1652]	—	—	673	1270	700	1344	728	1419	755	1493	783	1588	810	1642	838	1717	865	1791	938	1813	958	1832	978	1946	975	2059	1003	2173	1039	2286	1059	2400	1080	2513	1100	2627	1120	2740	1141	2854	1161	2968	1181	3081	—	—
3600 [1699]	—	—	686	1352	714	1427	741	1501	769	1576	796	1650	824	1725	851	1799	879	1874	945	1892	966	1951	986	2065	989	2178	1016	2292	1047	2405	1067	2519	1087	2632	1108	2746	1128	2859	1148	2973	1168	3086	1189	3200	—	—
3700 [1746]	672	1361	700	1435	727	1510	755	1584	782	1659	810	1733	837	1808	865	1882	933	1896	953	1956	973	2070	993	2183	1002	2297	1030	2410	1054	2524	1075	2637	1095	2751	1115	2864	1135	2978	1156	3091	1176	3205	1196	3318	—	—
3800 [1793]	686	1443	713	1518	741	1592	768	1667	796	1741	823	1818	861	1890	878	1965	940	2003	960	2075	981	2189	1001	2302	1016	2416	1043	2529	1062	2643	1082	2756	1102	2870	1123	2983	1143	3097	1163	3210	1183	3324	—	—	—	—
3900 [1841]	699	1526	727	1601	754	1675	782	1750	809	1824	837	1899	864	1973	927	2015	948	2080	968	2194	988	2307	1008	2421	1029	2534	1057	2648	1069	2761	1090	2875	1110	2988	1130	3102	1150	3215	1171	3329	1191	3442	—	—	—	—
4000 [1888]	713	1609	740	1683	768	1758	795	1832	823	1907	850	1961	878	2056	935	2085	955	2199	975	2312	996	2426	1016	2539	1043	2653	1070	2767	1077	2880	1097	2994	1117	3107	1138	3221	1158	3334	1178	3448	1199	3561	—	—	—	—
4100 [1935]	726	1692	754	1766	781	1841	809	1915	836	1990	864	2064	922	2091	942	2204	963	2318	983	2431	1003	2545	1024	2658	1056	2772	1084	2885	1084	2999	1105	3112	1125	3226	1145	3339	1166	3453	1186	3566	—	—	—	—	—	—
4200 [1982]	740	1774	767	1849	795	1923	822	1998	850	2072	877	2147	930	2209	950	2323	970	2438	990	2550	1011	2663	1031	2777	1070	2890	1097	3004	1092	3117	1112	3231	1133	3345	1153	3458	1173	3572	1193	3685	—	—	—	—	—	—
4300 [2029]	753	1857	781	1932	808	2006	836	2081	853	2155	917	2215	937	2328	957	2442	978	2555	998	2669	1018	2782	1039	2896	1083	3009	1111	3123	1099	3236	1120	3350	1140	3453	1160	3577	1181	3690	—	—	—	—	—	—	—	—
4400 [2077]	767	1940	794	2014	822	2089	849	2163	877	2238	924	2333	945	2447	965	2560	985	2674	1006	2787	1026	2901	1046	3014	1097	3128	1124	3241	1107	3355	1127	3468	1148	3582	1168	3695	1188	3809	—	—	—	—	—	—	—	—
4500 [2124]	780	2023	808	2097	835	2172	863	2248	912	2338	932	2452	952	2585	973	2679	993	2793	1013	2906	1033	3020	1054	3133	1110	3247	1138	3360	1115	3474	1135	3587	1155	3701	1175	3814	1196	3928	—	—	—	—	—	—	—	—
4600 [2171]	794	2105	821	2180	840	2254	876	2329	919	2457	940	2571	960	2684	980	2798	1000	2911	1021	3025	1041	3138	1061	3252	1124	3365	1151	3479	1122	3592	1142	3706	1163	3819	1183	3933	—	—	—	—	—	—	—	—	—	—
4700 [2218]	807	2188	835	2263	862	2337	906	2462	927	2576	947	2689	967	2803	988	2916	1008	3030	1028	3143	1048	3257	1069	3371	1137	3484	1165	3598	1130	3711	1150	3825	1170	3938	1190	4052	—	—	—	—	—	—	—	—	—	—
4800 [2265]	821	2271	848	2345	876	2420	914	2581	934	2695	955	2808	975	2922	995	3035	1015	3149	1036	3262	1056	3376	1076	3489	1151	3603	1178	3716	1137	3830	1157	3943	1178	4057	1198	4170	—	—	—	—	—	—	—	—	—	—

NOTE: L-Drive left of bold line, M-Drive right of bold line.

Drive Package	L						M					
Motor H.P. [W]	2.0 [1491.4]						3.0 [2237.1]					
Blower Sheave	BK90						BK65					
Motor Sheave	1VP-44						1VP-44					
Turns Open	**1**	2	3	4	5	6	1	2	3	4	5	**6**
RPM	**845**	810	775	739	704	669	1138	1089	1041	992	943	**894**

NOTES: 1. Factory sheave settings are shown in bold print.
2. Re-adjustment of sheave required to achieve rated airflow at ARI minimum E.S.P.
3. Do not operate above blower RPM shown as motor overloading will occur.
4. Do not set motor sheave below one turn open.

AIRFLOW CORRECTION FACTORS-C120 10 TON [35.2 kW]

ACTUAL—CFM [L/s]	3200 [1510]	3400 [1605]	3600 [1699]	3800 [1793]	4000 [1888]	4200 [1982]	4400 [2077]	4600 [2171]	4800 [2265]
TOTAL MBH	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04
SENSIBLE MBH	0.91	0.93	0.95	0.97	1.00	1.02	1.05	1.07	1.09
POWER kW	0.98	0.98	0.99	0.99	1.00	1.00	1.01	1.01	1.01

NOTES: 1. Multiply correction factor times gross performance data.
2. Resulting sensible capacity cannot exceed total capacity.

[ ] Designates Metric Conversions

COMPONENT AIR RESISTANCE, IWC-C120 10 TON [35.2 kW]

Component	Standard Indoor Airflow—CFM [L/s]								
	3200 [1510]	**3400 [1604]**	**3600 [1699]**	**3800 [1793]**	**4000 [1888]**	**4200 [1982]**	**4400 [2076]**	**4600 [2171]**	**4800 [2265]**
	Resistance—Inches Water [kPa]								
Wet Coil	0.065 [0.016]	0.071 [0.018]	0.076 [0.019]	0.082 [0.020]	0.087 [0.022]	0.093 [0.023]	0.099 [0.025]	0.105 [0.026]	0.110 [0.027]
Concentric Diffuser RXRN-FA65 or FA75 & Transition RXMC-CD04	0.31 [0.077]	0.37 [0.092]	DNA	DNA	DNA	DNA	DNA	DNA	DNA
Concentric Diffuser RXRN-AA61 or AA71 & Transition RXMC-CE05	DNA	DNA	0.17 [0.042]	0.18 [0.045]	0.21 [0.052]	0.24 [0.060]	0.27 [0.067]	DNA	DNA
Concentric Diffuser RXRN-AA66 or AA76 & Transition RXMC-CF06	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.31 [0.077]	0.32 [0.080]
Economizer 100% R.A. Damper Open	0.09 [0.022]	0.10 [0.025]	0.11 [0.027]	0.12 [0.030]	0.13 [0.032]	0.14 [0.035]	0.15 [0.037]	0.16 [0.040]	0.17 [0.042]
Horizontal Economizer 100% R.A. Damper Open	0.05 [0.012]	0.06 [0.014]	0.06 [0.015]	0.07 [0.017]	0.08 [0.020]	0.09 [0.021]	0.09 [0.022]	0.10 [0.024]	0.10 [0.025]
Horizontal Economizer 100% O.A. Damper Open	0.11 [0.027]	0.12 [0.030]	0.13 [0.032]	0.15 [0.0.36]	0.16 [0.040]	0.18 [0.044]	0.19 [0.047]	0.20 [0.50]	0.21 [0.052]

NOTE: Add component resistance to duct resistance to determine total external static pressure.
DNA = Data not Available.

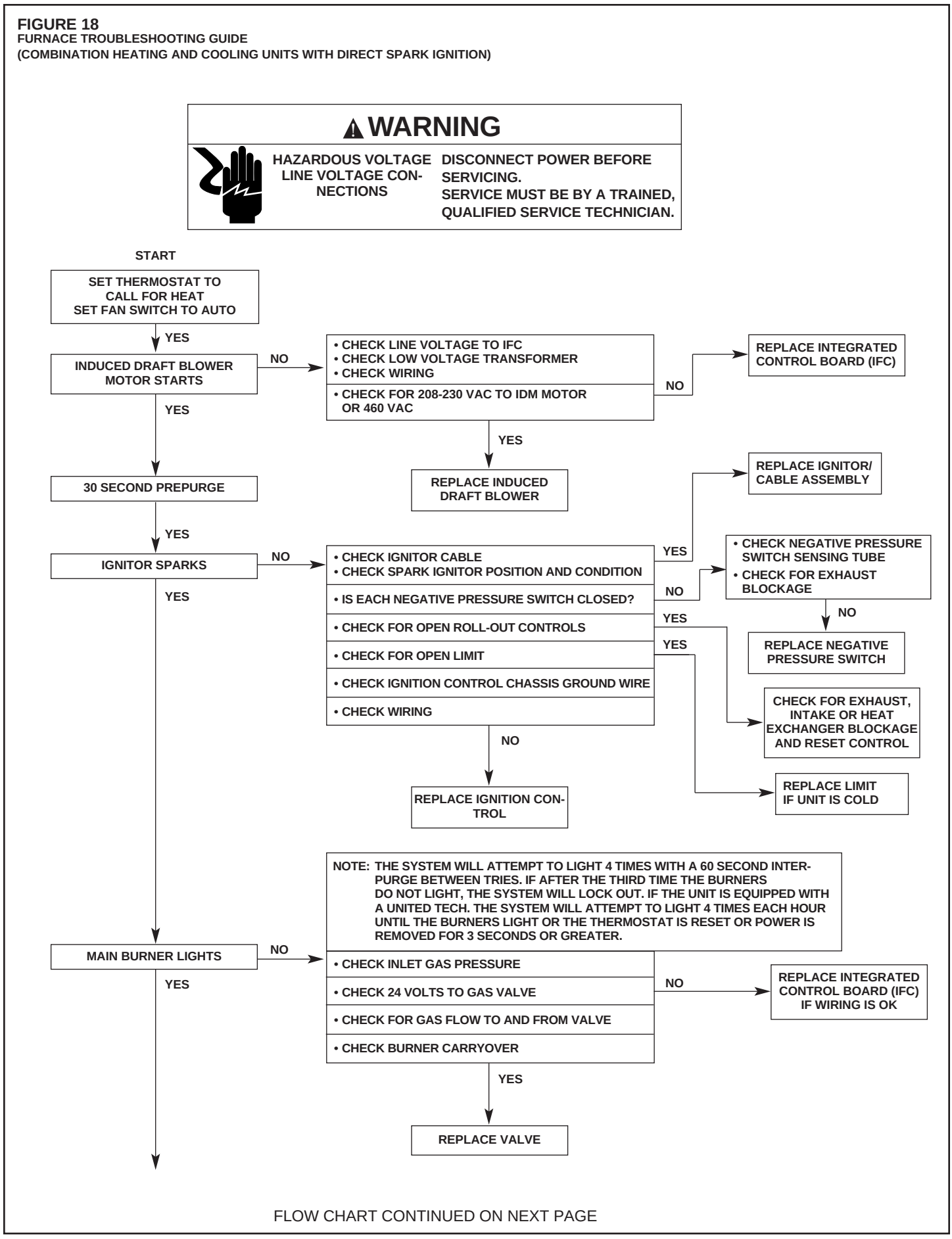
FIGURE 17
COOLING TROUBLE SHOOTING CHART

⚠ WARNING

DISCONNECT ALL POWER TO UNIT BEFORE SERVICING. CONTACTOR MAY BREAK ONLY ONE SIDE. FAILURE TO SHUT OFF POWER CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	• Power off or loose electrical connection • Thermostat out of calibration-set too high • Failed contactor • Blown fuses • Transformer defective • High pressure control open (if provided) • Interconnecting low voltage wiring damaged	• Check for correct voltage at compressor contactor in control box • Reset • Check for 24 volts at contactor coil - replace if contacts are open • Replace fuses • Check wiring-replace transformer • Reset-also see high head pressure remedy-The high pressure control opens at 610 PSIG • Replace thermostat wiring
Condenser fan runs, compressor doesn't	• Loose connection • Compressor stuck, grounded or open motor winding open internal overload. • Low voltage condition • Low voltage condition	• Check for correct voltage at compressor - check & tighten all connections • Wait at least 2 hours for overload to reset. If still open, replace the compressor. At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating. • Add start kit components
Insufficient cooling	• Improperly sized unit • Improper airflow • Incorrect refrigerant charge • Air, non-condensibles or moisture in system • Incorrect voltage	• Recalculate load • Check - should be approximately 400 CFM per ton. • Charge per procedure attached to unit service panel. • Recover refrigerant, evacuate & recharge, add filter drier • At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.
Compressor short cycles	• Incorrect voltage • Defective overload protector • Refrigerant undercharge	• At compressor terminals, voltage must be ± 10% of nameplate marking when unit is operating. • Replace - check for correct voltage • Add refrigerant
Registers sweat	• Low evaporator airflow • Room thermostat set too low	• Increase speed of blower or reduce restriction - replace air filter
High head-low vapor pressures	• Restriction in liquid line, expansion device or filter drier • Flow check piston size too small • Incorrect capillary tubes	• Remove or replace defective component • Change to correct size piston • Change coil assembly • Increase set point on thermostat
High head-high or normal vapor pressure - Cooling mode	• Dirty condenser coil • Refrigerant overcharge • Condenser fan not running • Air or non-condensibles in system	• Clean coil • Correct system charge • Repair or replace • Recover refrigerant, evacuate & recharge
Low head-high vapor pressures	• Defective Compressor valves • Incorrect capillary tubes	• Replace compressor • Replace coil assembly
Low vapor - cool compressor - iced evaporator coil	• Low evaporator airflow • Operating below 65°F outdoors • Moisture in system	• Increase speed of blower or reduce restriction - replace air filter • Add Low Ambient Kit • Recover refrigerant - evacuate & recharge - add filter drier
High vapor pressure	• Excessive load • Defective compressor	• Recheck load calculation • Replace
Fluctuating head & vapor	• Overcharged • Air or non-condensibles in system	• Check air distribution on coil – adjust charge. • Recover refrigerant, evacuate & recharge
Gurgle or pulsing noise at expansion device or liquid line	• Air or non-condensibles in system	• Recover refrigerant, evacuate & recharge

FIGURE 18
FURNACE TROUBLESHOOTING GUIDE
(COMBINATION HEATING AND COOLING UNITS WITH DIRECT SPARK IGNITION)



FLOW CHART CONTINUED ON NEXT PAGE

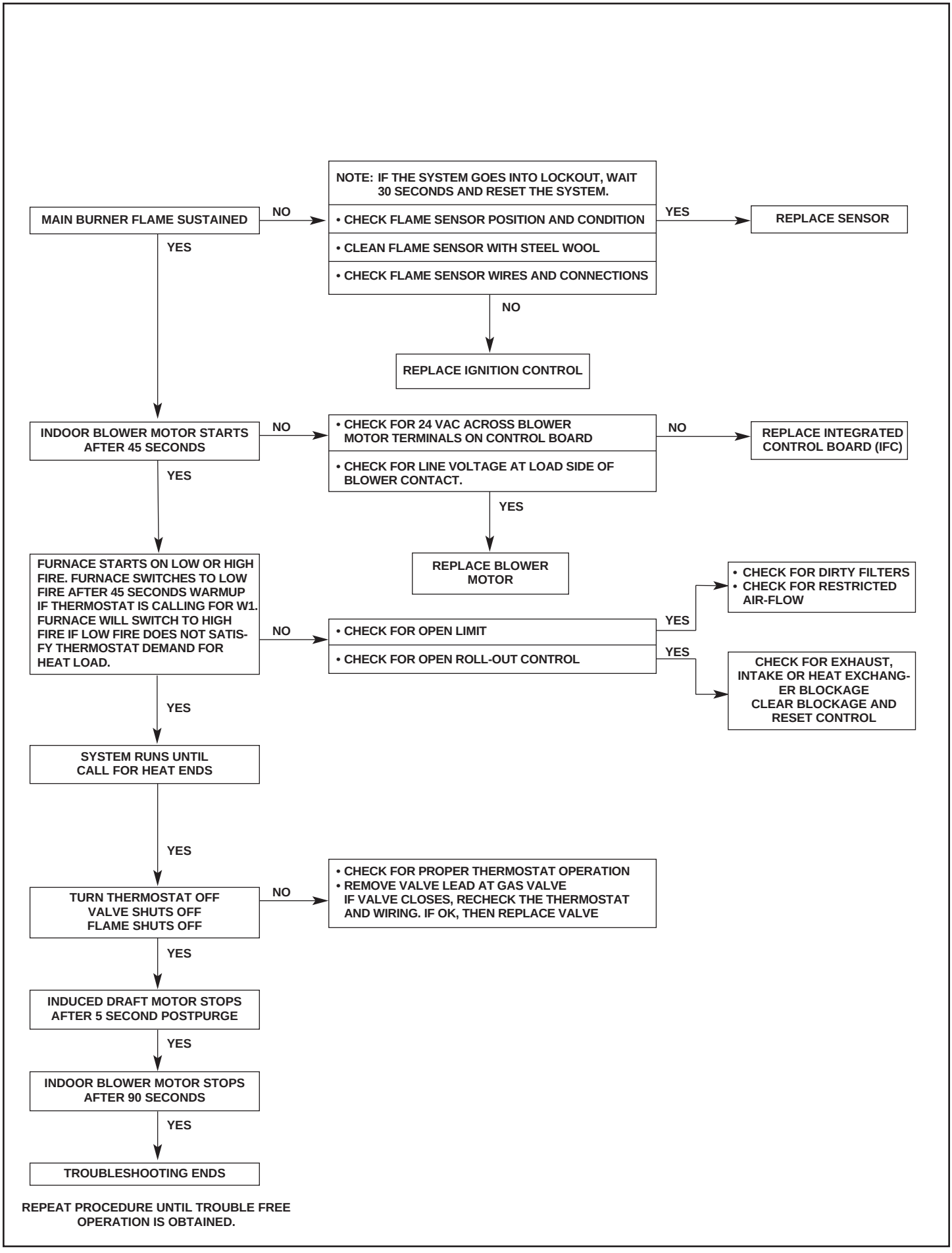
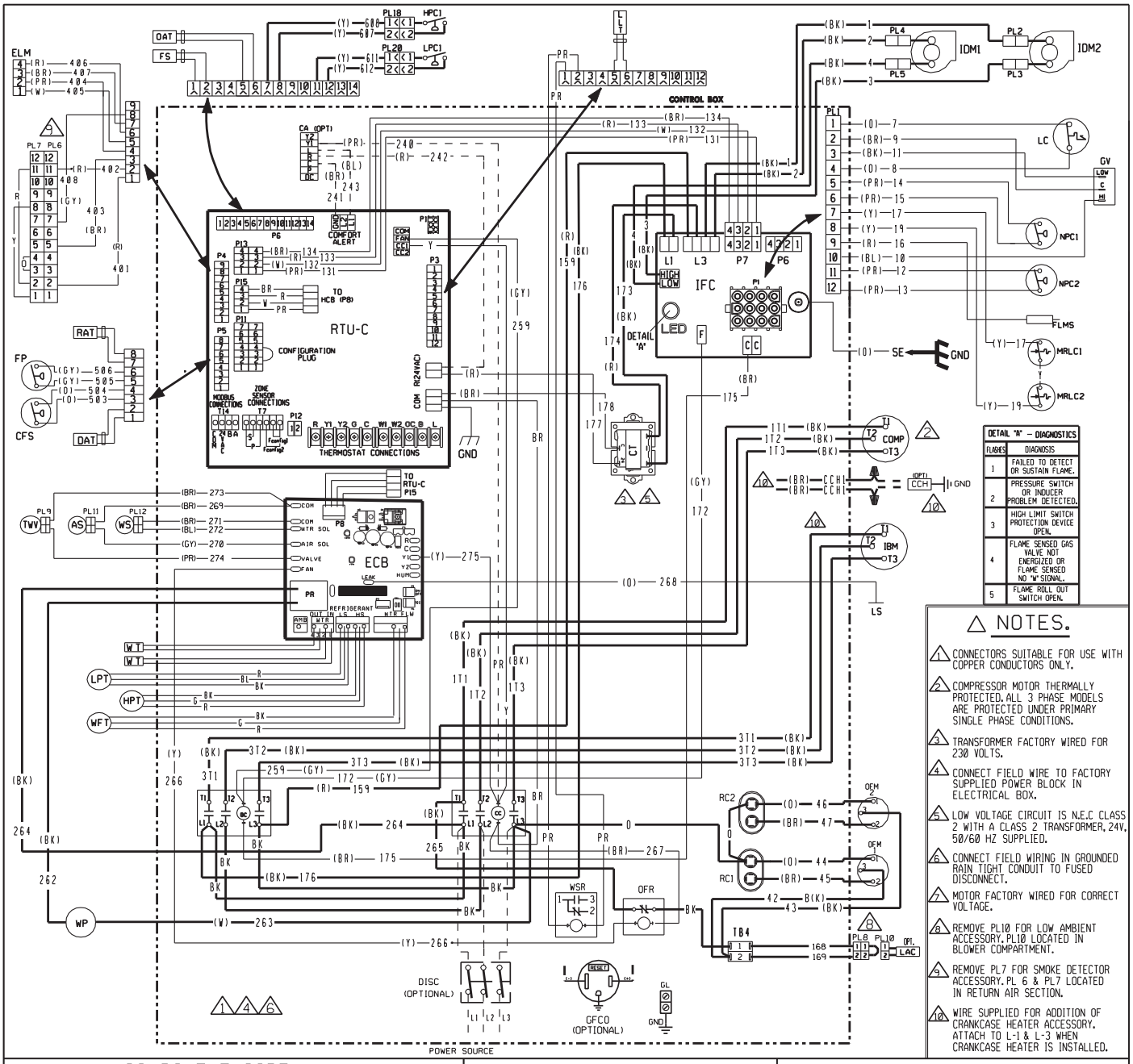

MAIN BURNER FLAME SUSTAINED
NO
NOTE: IF THE SYSTEM GOES INTO LOCKOUT, WAIT 30 SECONDS AND RESET THE SYSTEM.
• CHECK FLAME SENSOR POSITION AND CONDITION
• CLEAN FLAME SENSOR WITH STEEL WOOL
• CHECK FLAME SENSOR WIRES AND CONNECTIONS
YES
REPLACE SENSOR
YES
NO
REPLACE IGNITION CONTROL
INDOOR BLOWER MOTOR STARTS AFTER 45 SECONDS
NO
• CHECK FOR 24 VAC ACROSS BLOWER MOTOR TERMINALS ON CONTROL BOARD
• CHECK FOR LINE VOLTAGE AT LOAD SIDE OF BLOWER CONTACT.
NO
REPLACE INTEGRATED CONTROL BOARD (IFC)
YES
YES
REPLACE BLOWER MOTOR
FURNACE STARTS ON LOW OR HIGH FIRE. FURNACE SWITCHES TO LOW FIRE AFTER 45 SECONDS WARMUP IF THERMOSTAT IS CALLING FOR W1. FURNACE WILL SWITCH TO HIGH FIRE IF LOW FIRE DOES NOT SATISFY THERMOSTAT DEMAND FOR HEAT LOAD.
NO
• CHECK FOR OPEN LIMIT
• CHECK FOR OPEN ROLL-OUT CONTROL
YES
• CHECK FOR DIRTY FILTERS
• CHECK FOR RESTRICTED AIR-FLOW
YES
CHECK FOR EXHAUST, INTAKE OR HEAT EXCHANGER BLOCKAGE
CLEAR BLOCKAGE AND RESET CONTROL
YES
SYSTEM RUNS UNTIL CALL FOR HEAT ENDS
YES
TURN THERMOSTAT OFF
VALVE SHUTS OFF
FLAME SHUTS OFF
NO
• CHECK FOR PROPER THERMOSTAT OPERATION
• REMOVE VALVE LEAD AT GAS VALVE
IF VALVE CLOSES, RECHECK THE THERMOSTAT AND WIRING. IF OK, THEN REPLACE VALVE
YES
INDUCED DRAFT MOTOR STOPS AFTER 5 SECOND POSTPURGE
YES
INDOOR BLOWER MOTOR STOPS AFTER 90 SECONDS
YES
TROUBLESHOOTING ENDS
REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED.

FIGURE 19 H2AC ROOFTOP UNIT ALARMS AND TROUBLESHOOTING

Alarm Designation	MODBUS "Current Alarm" Code	Description	Troubleshooting Information
H2AC Rooftop Unit Water Leakage	102	The sensor in the water heating (hybrid) section of the unit has detected a water leak and stopped water heating operation. A relay output for an optional field-installed water shutoff valve is energized.	> Check for loose or defective air vent valve on water discharge line in water heating section. > Check for water pump seal leakage. > Check that sensor is installed correctly on control. > Replace the sensor.
H2AC Rooftop Unit Low Water Pressure	103	No alarm is set. The water sensor measures potable water pressure in the water heating section. If the water pressure is below 5 PSIG, water heating operation will not begin. If the sensor becomes unavailable, water heating operation terminates. The unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Freeze Protection Mode	104	The outdoor ambient sensor on the RTU-C has detected outdoor ambient temperature below 35°F. The water pump is energiced continuously until the outdoor ambient temperature rises above 38°F.	> Check that sensor is installed correctly on control. > Check sensor location. > Replace the sensor.
H2AC Rooftop Unit Solenoid Fault	105	At the beginning of each water heating cycle, if the high pressure sensor value exceeds 530 PSIG after 3 seconds but before 60 seconds are elapsed, an alarm is set.	> Check water pump operation, shut-off valves, etc. for adequate water flow. > Check for 24VAC at control transformer > Check for 24VAC at hybrid unit 3-way refrigerant valve. > Increase water sample delay time using DIP switches on hybrid control. > Replace 3-way refrigerant valve if it fails to shift.
H2AC Rooftop Unit Ambient Sensor Fault	106	The water pump is energzed continuously until the sensor becomes available.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Inlet Sensor Fault	107	If the sensor becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Outlet Sensor Fault	108	If the sensor becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Inlet and Outlet Sensor Fault	109	If both sensors becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensors.
H2AC Rooftop Unit High Pressure Sensor Fault	110	The high pressure sensor measures liquid refrigerant pressure. If the sensor becomes unavailable, water heating operation terminates and an alarm is set. Unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Low Pressure Sensor Fault	111	The low pressure sensor measures liquid refrigerant pressure. If the sensor becomes unavailable, water heating operation terminates and an alarm is set. Unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Lockout Fault	112	If alarms 105, 115, 116, 117, or 118 are initiated more than 3 times from unit power-up, an alarm is set and water heating mode is terminated until the alarm is cleared. **The lockout fault can only be cleared by removing power to the unit or by sending a "Clear All Alarms" command through the BAS network.**	> Check individual alarms.
H2AC Rooftop Unit Low Subcooling - water heating mode	115	If, 2 minutes after the 3-way valve has shifted, low subcooling was continuously measured for more than 30 seconds during the water heating mode an alarm is set. Unit operation continues.	> If low subcooling occurs after exiting the air conditioning mode, check wiring and verify operation of outdoor refrigerant (air side) solenoid. > Check location of liquid line temperature sensor. > Verify correct refrigerant charge.
Low Subcooling - air conditioning mode	116	If, 2 minutes after the 3-way valve has shifted, low subcooling was continuously measured for more than 30 seconds during the air conditining mode an alarm is set. Unit operation continues.	> If low subcooling occurs after exiting the water heating mode, check wiring and verify operation of flat plate heat exchanger (water side) solenoid. > Check location of liquid line temperature sensor. > Verify correct refrigerant charge.
High Superheat - water heating mode	117	If, 2 minutes after the 3-way valve has shifted, high superheat was continuously measured for more than 30 seconds during the water heating mode an alarm is set. Unit operation continues.	> High internal building load. > Expansion valve is not operating correctly.
High Superheat - air conditioning heating mode	118	If, 2 minutes after the 3-way valve has shifted, high superheat was continuously measured for more than 30 seconds during the air conditioning mode an alarm is set. Unit operation continues.	> If high superheat occurs after exiting the water heating mode, check wiring and verify operation of flat plate heat exchanger (water side) solenoid. > High internal building lode. > Expansion valve is not operating correctly.

FIGURE 20



COMPONENT CODE

AS	AIR SOLENOID	LAC	LOW AMBIENT COOLING CONTROL
BC	BLOWER CONTACTOR	LC	LIMIT CONTROL
CA	COMFORT ALERT MODULE	LLT	LIQUID LINE TEMPERATURE
CC	COMPRESSOR CONTACTOR	LPC	LOW PRESSURE CONTROL
CCH	CRANKCASE HEATER	LPT	LOW PRESSURE TRANSDUCER
CFS	CLOGGED FILTER SWITCH	LS	LEAK SENSOR
COMP	COMPRESSOR	MRLC	MANUAL RESET LIMIT CONTROL
CT	CONTROL TRANSFORMER	NPC	NEGATIVE PRESSURE CONTROL
DAT	DISCHARGE AIR SENSOR	OAT	OUTSIDE AIR SENSOR
DISC	DISCONNECT SWITCH	OFM	OUTDOOR FAN MOTOR
ECB	eSYNC CONTROL BOARD	OFR	OUTDOOR FAN RELAY
ELM	ECONOMIZER LOGIC MODULE	PL	PLUG
FLMS	FLAME SENSOR	PR	PUMP RELAY
FP	FAN PROVING	RAT	RETURN AIR SENSOR
FS	FREEZE SENSOR	RC	RUN CAPACITOR
GFCO	GROUND FAULT CONVENIENCE OUTLET	RTU-C	ROOFTOP UNIT CONTROL
GL	GROUND LUG	SE	SPARK ELECTRODE
GND	GROUND	TB	TERMINAL BLOCK
GV	GAS VALVE	TWV	THREE-WAY VALVE
HPC	HIGH PRESSURE CONTROL	WFT	WATER FLOW TRANSDUCER
HPT	HIGH PRESSURE TRANSFORMER	WP	WATER PUMP
IBM	INDOOR BLOWER MOTOR BELT DRIVE	WS	WATER SOLENOID
IDM	INDUCED DRAFT MOTOR	WSR	WATER SHUTOFF RELAY
IFC	INTEGRATED FURNACE CONTROL	WT	WATER TEMPERATURE SENSOR

WIRE NUT

WIRING INFORMATION

LINE VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

REPLACEMENT WIRE
- -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.)

WARNING
- -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., AND LOCAL CODES AS APPLICABLE.

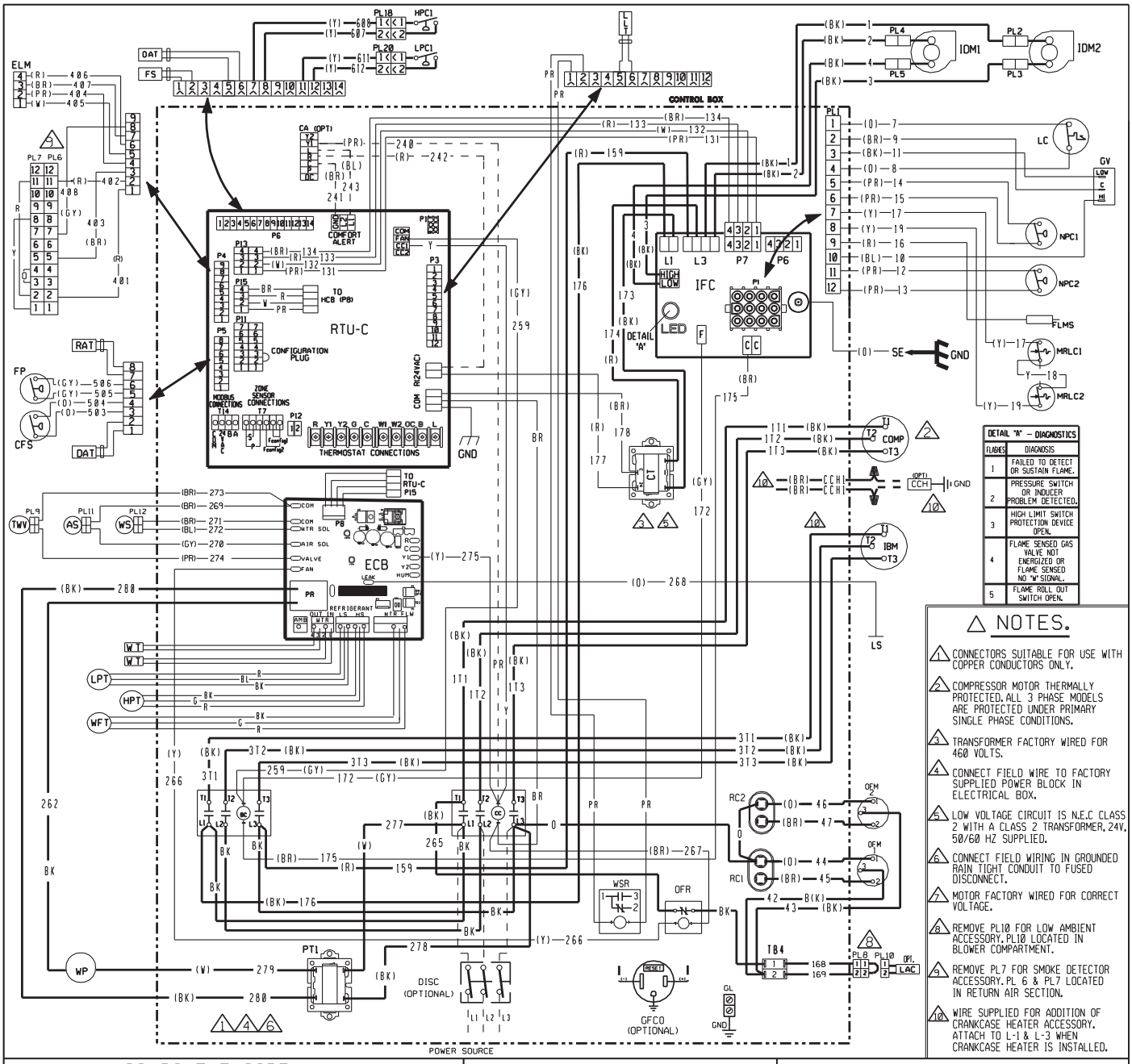
WIRE COLOR CODE

BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
GY	GRAY	Y	YELLOW

WIRING DIAGRAM
?KHL-C120C
208-230V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-14-11	90-103089-14	02

FIGURE 21



DETAIL "A" – DIAGNOSTICS

FLASHES	DIAGNOSIS
1	FAILED TO DETECT OR SUSTAIN FLAME.
2	PRESSURE SWITCH OR INDUCER PROBLEM DETECTED.
3	HIGH LIMIT SWITCH PROTECTION DEVICE OPEN.
4	FLAME SENSED GAS VALVE NOT ENERGIZED OR FLAME SENSED NO "W" SIGNAL.
5	FLAME ROLL OUT SWITCH OPEN.

△ NOTES.

1. △ CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
2. △ COMPRESSOR MOTOR THERMALLY PROTECTED. ALL 3 PHASE MODELS ARE PROTECTED UNDER PRIMARY SINGLE PHASE CONDITIONS.
3. △ TRANSFORMER FACTORY WIRED FOR 460 VOLTS.
4. △ CONNECT FIELD WIRE TO FACTORY SUPPLIED POWER BLOCK IN ELECTRICAL BOX.
5. △ LOW VOLTAGE CIRCUIT IS N.E.C CLASS 2 WITH A CLASS 2 TRANSFORMER, 24V, 50/60 HZ SUPPLIED.
6. △ CONNECT FIELD WIRING IN GROUNDED RAIN TIGHT CONDUIT TO FUSED DISCONNECT.
7. △ MOTOR FACTORY WIRED FOR CORRECT VOLTAGE.
8. △ REMOVE PL10 FOR LOW AMBIENT ACCESSORY. PL10 LOCATED IN BLOWER COMPARTMENT.
9. △ REMOVE PL7 FOR SMOKE DETECTOR ACCESSORY. PL 6 & PL7 LOCATED IN RETURN AIR SECTION.
10. △ WIRE SUPPLIED FOR ADDITION OF CRANKCASE HEATER ACCESSORY. ATTACH TO L-1 & L-3 WHEN CRANKCASE HEATER IS INSTALLED.

COMPONENT CODE

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BC	BLOWER CONTACTOR	LC	LIMIT CONTROL
CA	COMFORT ALERT MODULE	LLT	LIQUID LINE TEMPERATURE
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CCH	CRANKCASE HEATER	LPT	LOW PRESSURE TRANSDUCER
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DISC	DISCONNECT SWITCH	OFM	OUTDOOR FAN MOTOR
ECB	eSYNC CONTROL BOARD	OFR	OUTDOOR FAN RELAY
ELM	ECONOMIZER LOGIC MODULE	PL	PLUG
FLMS	FLAME SENSOR	PR	PUMP RELAY
FP	FAN PROVING	PT	POWER TRANSFORMER
FS	FREEZE SENSOR	RAT	RETURN AIR SENSOR
GFCO	GROUND FAULT CONVENIENCE OUTLET	RC	RUN CAPACITOR
GL	GROUND LUG	RTU-C	ROOFTOP UNIT CONTROL
GND	GROUND	SE	SPARK ELECTRODE
GV	GAS VALVE	TB	TERMINAL BLOCK
HPC	HIGH PRESSURE CONTROL	WFT	WATER FLOW TRANSDUCER
HPT	HIGH PRESSURE TRANSDUCER	WP	WATER PUMP
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IDM	INDUCED DRAFT MOTOR	WSR	WATER SHUTOFF RELAY
IFC	INTEGRATED FURNACE CONTROL	WT	WATER TEMPERATURE SENSOR

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- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

REPLACEMENT WIRE
- -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.)

WARNING
- -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., AND LOCAL CODES AS APPLICABLE.

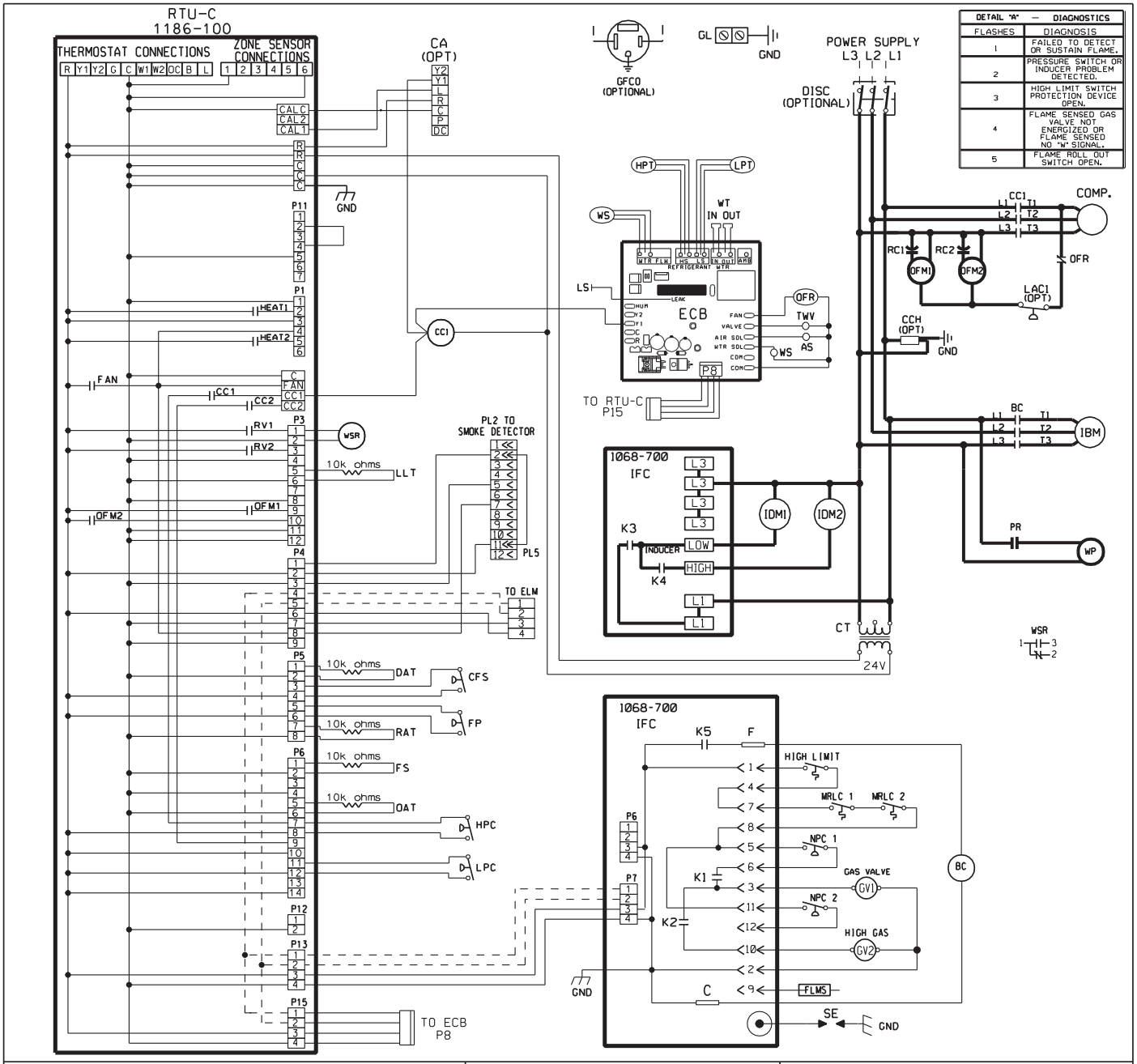
WIRE COLOR CODE

BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
GY	GRAY	Y	YELLOW

WIRING DIAGRAM
?KHL-C120D
460V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-14-11	90-103089-16	Ø1

FIGURE 22



COMPONENT CODE

AS	AIR SOLENOID	LAC	LOW AMBIENT COOLING CONTROL	WIRE NUT
BC	BLOWER CONTACTOR	LC	LIMIT CONTROL	
CA	COMFORT ALERT MODULE	LLT	LIQUID LINE TEMPERATURE	
CC	COMPRESSOR CONTACTOR	LPC	LOW PRESSURE CONTROL	
CCH	CRANKCASE HEATER	LPT	LOW PRESSURE TRANSDUCER	
CFS	CLOGGED FILTER SWITCH	LS	LEAK SENSOR	
COMP	COMPRESSOR	MRLC	MANUAL RESET LIMIT CONTROL	
CT	CONTROL TRANSFORMER	NPC	NEGATIVE PRESSURE CONTROL	
DAT	DISCHARGE AIR SENSOR	OAT	OUTSIDE AIR SENSOR	
DISC	DISCONNECT SWITCH	OFM	OUTDOOR FAN MOTOR	
ECB	eSYNC CONTROL BOARD	OFR	OUTDOOR FAN RELAY	
ELM	ECONOMIZER LOGIC MODULE	PL	PLUG	
FLMS	FLAME SENSOR	PR	PUMP RELAY	
FP	FAN PROVING	RAT	RETURN AIR SENSOR	
FS	FREEZE SENSOR	RC	RUN CAPACITOR	
GFCO	GROUND FAULT CONVENIENCE OUTLET	RTU-C	ROOFTOP UNIT CONTROL	
GL	GROUND LUG	SE	SPARK ELECTRODE	
GND	GROUND	TB	TERMINAL BLOCK	
GV	GAS VALVE	TWV	THREE-WAY VALVE	
HPC	HIGH PRESSURE CONTROL	WFT	WATER FLOW TRANSDUCER	
HPT	HIGH PRESSURE TRANSFORMER	WP	WATER PUMP	
IBM	INDOOR BLOWER MOTOR BELT DRIVE	WS	WATER SOLENOID	
IDM	INDUCED DRAFT MOTOR	WSR	WATER SHUTOFF RELAY	
IFC	INTEGRATED FURNACE CONTROL	WT	WATER TEMPERATURE SENSOR	

WIRING INFORMATION

LINE VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

REPLACEMENT WIRE
- -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.)

WARNING
- -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., AND LOCAL CODES AS APPLICABLE.

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BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
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WIRING SCHEMATIC

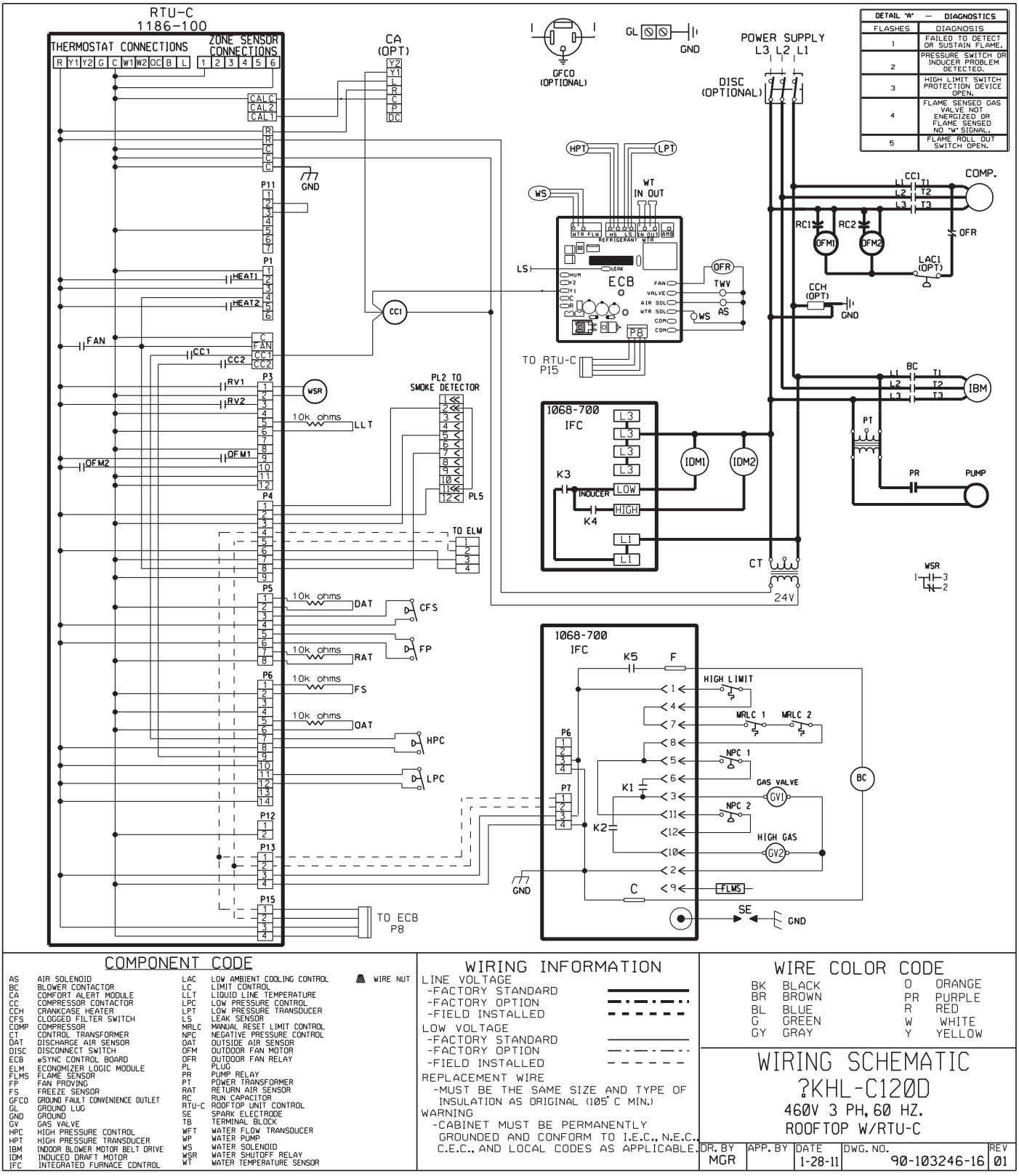
?KHL-C120C

208-230V 3 PH, 60 HZ.

ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-28-10	90-103246-14	03

FIGURE 23



COMPONENT CODE

AS	AIR SOLENOID	LAC	LOW AMBIENT COOLING CONTROL		WIRE NUT
BC	BLOWER CONTACTOR	LC	LIMIT CONTROL		
CA	COMFORT ALERT MODULE	LLT	LIQUID LINE TEMPERATURE		
CC	COMPRESSOR CONTACTOR	LPC	LOW PRESSURE CONTROL		
CCH	CRANKCASE HEATER	LPT	LOW PRESSURE TRANSDUCER		
CFS	CLOGGED FILTER SWITCH	LS	LEAK SENSOR		
COMP	COMPRESSOR	MRLC	MANUAL RESET LIMIT CONTROL		
CT	CONTROL TRANSFORMER	NPC	NEGATIVE PRESSURE CONTROL		
DAT	DISCHARGE AIR SENSOR	OAT	OUTSIDE AIR SENSOR		
DISC	DISCONNECT SWITCH	OFM	OUTDOOR FAN MOTOR		
ECB	eSYNC CONTROL BOARD	OFR	OUTDOOR FAN RELAY		
ELM	ECONOMIZER LOGIC MODULE	PL	PLUG		
FLMS	FLAME SENSOR	PR	PUMP RELAY		
FP	FAN PROVING	PT	POWER TRANSFORMER		
FS	FREEZE SENSOR	RAT	RETURN AIR SENSOR		
GFCO	GROUND FAULT CONVENIENCE OUTLET	RC	RUN CAPACITOR		
GL	GROUND LUG	RTU-C	ROOFTOP UNIT CONTROL		
GND	GROUND	SE	SPARK ELECTRODE		
GV	GAS VALVE	TB	TERMINAL BLOCK		
HPC	HIGH PRESSURE CONTROL	WFT	WATER FLOW TRANSDUCER		
HPT	HIGH PRESSURE TRANSDUCER	WP	WATER PUMP		
IBM	INDOOR BLOWER MOTOR BELT DRIVE	WS	WATER SOLENOID		
IDM	INDUCED DRAFT MOTOR	WSR	WATER SHUTOFF RELAY		
IFC	INTEGRATED FURNACE CONTROL	WT	WATER TEMPERATURE SENSOR		

WIRING INFORMATION

LINE VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

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BR	BROWN	PR	PURPLE
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G	GREEN	W	WHITE
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WIRING SCHEMATIC

?KHL-C120D

460V 3 PH, 60 HZ.

ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-28-11	90-103246-16	Ø1

FIGURE 24

RKHL SYSTEM CHARGE CHART

